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Northeast Civil Solutions
INCORPORATED

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July 11, 2007

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RE: Village at Little Falls Peer Review Response to Comments

Dear Brooks,

Please find a response to the comments generated by Gorrill Palmers Peer Review dated July 5, 2007. Northeast Civil Solutions (NCS) has prepared a response to each comment in bold type.

Stormwater Management Plan Review

General Comments:

1. Since the development includes more than 3.0 acres of impervious area, it requires a Site Location of Development Act (SLDA) permit from the Maine DEP. The project is subject to the MDEP Stormwater Management Law (effective November 2005) and is required to meet Basic Standards and General Standards as defined in the Law. We understand that MDEP has agreed with the applicant that the MDEP Flooding Standard is not applicable to this project, due to direct discharge of stormwater to the Presumpscot River and the presumption of no significant impact on peak flows downstream of the site. Stormwater detention facilities to control peak rates of runoff from the development are therefore not required. Gorrill-Palmer has not reviewed the project for conformance to the MDEP Stormwater Management Law, nor for conformance with SLDA requirements.
2. The development proposes to use an underground detention and soil filter (StormTech) system and bioretention cells to provide water quality treatment required by MDEP Stormwater Law standards.

Stormwater Management Report:

3. Appendix B - The stormwater report shows an offsite drainage area of +/- 6.3 acres that presently drains into an existing culvert under the railroad tracks and flows across the property to the Presumpscot River. This drainage area includes High Street, several houses and open areas. This area appears to measure approximately 7.5 acres from the map provided in the report. The size of this drainage area should be confirmed using 1"=2000' scale USGS topographic maps. **We have confirmed that the size of the off-site drainage area is equal to 6.3 acres. The USGS map included in the attached Stormwater Management Report was printed at a scale of 1"=2000' for your use.**

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New Contract

4. Appendix I – The maintenance contract with Clean Harbors should specify that all components of the proposed stormwater management system will be maintained in accordance with the maintenance plan approved by the Maine DEP. The contract should also specify that the StormTech detention/filter system will be maintained in accordance with the Manufacturer's recommended maintenance plan. **The attached contract and maintenance plan has been revised as requested.**
5. Appendix L – The condominium association documents, Article 8, Section 8.2, should specify that Portland Water District will maintain the sewage pump station and sewer system, if that is the intent of the applicant. **Homeowner Documents will be revised and included in the final application.** HOA
6. Appendix L – Provisions i thru vi relating to stormwater management system maintenance should be revised to include maintenance of bioretention cells and maintenance of the StormTech detention/filter system in accordance with the manufacturer's recommended maintenance plan. **Homeowner Documents will be revised and included in the final application.** HOA

Exhibit 14, Conformance with Town Site Plan Requirement

7. Section F on page 2 states that "stormwater will be detained onsite in order to reduce stormwater discharge to rates less than predevelopment flows." A similar statement also appears on page 1 of Exhibit 18, Community Facilities Impact. These statements should be revised to indicate that increased site runoff is not anticipated to increase peak flow rates in the Presumpscot River. **Attached, please find a revised Section A Exhibit 18 and Section B Exhibit 14. The sections have been revised to state that the increase in site runoff will not increase peak flow rates in the Presumpscot River.**

Underground Detention/Filter System:

8. Gorrill-Palmer did not conduct a detailed review of the detention/filter system design. We assume that NCS will coordinate design details with the StormTech manufacturer's representative and that MDEP will review the design for conformance with MDEP Stormwater Law Standards. **The MDEP is currently reviewing the stormwater design as part of the Site Location of Development Permit review. Furthermore, a copy of the underground detention plans have been forwarded to StormTech. Please refer to the attached Section 9 for a copy of the correspondence with StormTech.**
9. The plans show the offsite area noted in the comment #3 draining into the proposed storm drainage system for the development, and flowing into the proposed detention/filter system. The stormwater calculations indicate that sizing of the detention/filter system is based on the proposed impervious and landscaped areas within the development, not including the offsite area. The applicant should request MDEP to confirm that the detention/filter system is appropriately sized to handle both onsite and offsite runoff as proposed. **Attached as Section 3, please find a copy of the correspondence with DEP regarding the sizing of the filtration system. Please note that Marianne Hubert, Stormwater Reviewing Engineer for the DEP, confirmed that the proposed configuration is acceptable. Written confirmation to follow in final application.**
10. Depending on MDEP confirmation of the detention/filter system sizing as noted in the previous comment, NCS may need to consider either bypassing the offsite flows around the system, or other modifications to the proposed design. **Based upon the response from the DEP, bypassing the off-site flows will not be necessary.**
11. If the offsite drainage area is directed to the detention/filter system as designed, the plans should include sediment pretreatment measures for this offsite flow. **The sediment loading calculation for the system is included in Appendix N of the revised Stormwater Management Report. The sediment loading from the off-site drainage area was included in these calculations. The calculation indicates that 172 cubic feet of sediment per year is anticipated. The proposed**

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underground detention system will hold a water quality volume of 17, 227 cubic feet however, only 16,980 cubic feet of water quality volume is required by the Maine DEP. Therefore, the system has the excess capacity of 247 cubic feet which is greater than the anticipated annual sediment loading of 172 cubic feet.

12. The plans appear to use catch basins with 3-foot deep sumps and hoods for sediment pretreatment of stormwater flows to the detention/filter system. NCS should provide sediment volume calculations based on MDEP requirements and confirm that adequate sediment storage volume is provided. Please see attached sediment storage calculations confirming that adequate storage has been provided. See Stormwater Report in Section 2, Appendix N.

Plan Set Review

General Comments:

13. Notes referring to the Depot Street reconstruction plans should be added to each of the Grading and Drainage Plan, Site Plan, and Utility Plan sheets bordering Depot Street. Limits of construction, pavement saw cut locations, grading, utilities, drainage systems and other construction should be coordinated with the Depot Street Improvement plans. If the Depot Street Improvement Project may be constructed under a separate contract, the plans should contain specific information and notes to coordinate Depot Street construction with onsite construction. **The Depot Street Improvement Plan was added to the set as a reference plan to identify the grades of the improvements and show the appropriate tie-ins with the on-site construction. There is an entire plan set showing all off-site improvements including details and typical sections. These improvements will likely not be included in the site development contract. Please see notes calling out Depot Street Profile as reference only on sheet 38.**
14. Plans should include trench cap details conforming to Town and MDOT requirements for all proposed utility construction within Route 202 and Depot Street. **With the number of utilities being constructed in Depot Street it will be unnecessary to trench cap the utilities as the entire road will re-paved.**

Sheet 2 of 38, Existing Conditions Plan:

15. The plan should be stamped by a surveyor licensed in Maine. **The existing conditions plan has been stamped by a surveyor.**
16. Abutting properties across Depot Street and the railroad ROW should be shown on this plan and the preliminary subdivision plan. **Abutting properties, with tax map and lot numbers are shown on the cover sheet. The abutters as required by the Town cannot be shown on the existing conditions or subdivision plan.**

Sheet 3 of 38, Preliminary Subdivision Plan:

17. All State and Federal permits applicable to the project should be noted on the subdivision plan. **All State and federal permits required for this project have been listed on the subdivision plan in note 22.**
18. A note referring to the Conditional Letter of Map Amendment based on Fill (CLOMR-F), as approved by FEMA, should be included on the plan. **A note referencing the approved CLOMR-F is shown on this plan.**
19. The source of the boundary survey should be clearly noted on the plan. **All reference plans used to compile the boundary survey are listed on this plan.**
20. Note 20 should be revised when the Phase II archaeological survey has been completed. **The Phase II Archaeological Survey was recently completed and references approval letter from Earle Shettleworth at Maine Historic Preservation Commission, dated June 27, 2007, which can be found in Section 10.**

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21. The plan shows a "proposed 20' grading easement" within the existing railroad tracks on the east side of the project. The applicant should provide documentation that this easement has been approved by MDOT, and the Railroad if applicable. **The acquisition of this easement is currently underway, the applicant is aware that this easement is required before final approval.**
22. Gorrill-Palmer assumes that a condominium plat plan suitable for recording at the Cumberland County Registry of Deeds will be submitted with the final subdivision application. **The client's attorney recommends that the condominium plat be prepared after approval of the project. Typically, the approved subdivision plan is referenced to the condominium plat. This is a process that occurs after approval and prior to the first sale.**

Sheet 4 of 38, Demolition Plan

23. This plan should include notes referring to fill requirements and other applicable provisions of the project geotechnical report. **The intent of the demolition plan is to indicate the items to be removed from the site, not to show any proposed construction. In order to keep the plans as readable as possible a separate demolition plan was added to the plan set.**
24. A plan, details and specifications for the pre-load area should be provided. It is not the intent of this plan to show pre-loading. The erosion control plan calls out the limits of the pre-load area. **The final application will include a pre-load plan.**
25. A demolition-phase erosion control plan should be included in the plan set, showing required erosion control measures as stated in Note 3 on this plan. **NCS disagrees and stands by the Erosion and Sedimentation Control Plan as shown on Sheet 23. The Construction Sequencing Notes explain the phasing of erosion controls on Sheet 24. This sequencing requires all erosion control measures to be in place prior to demolition.**
26. Site access locations for demolition operations should be shown on the plan. **Site access points have been shown on this plan as well as the emergency access, which is not to be used during construction.**
27. Note 4 states that "site cleanup and demolition must be limited to the parcel owned by HRC..." The plan should include appropriate easements relating to any work outside the site boundaries, specifically any work in the Railroad ROW (as shown on the Grading Plans, Sheets 7 and 8 of 38), and removal of the existing building that straddles the property line at the northeast corner of the site. **The client's attorney is in the process of obtaining construction and grading easement from Maine Central Railroad (Gilford).**
28. The existing railroad tracks abutting the site should be shown on the plan. **The mainline tracks were removed a couple of years ago, however the spur into the site remains. This will be revised on the plan.**

Sheet 6 of 38, Grading & Drainage Plan – Sheet 2

29. Grading at the proposed curb line along the south side of Depot Street does not show the 6" curb reveal. **The grading in this area overlaps with the Depot Street Improvement Plans where the sidewalk and grading are shown. A separate plan set has been completed for the Depot Street Improvements and will not be part of the on-site contract.**
30. Guardrail should be provided at the paved apron on the west side of the pump station generator building adjacent to the riverbank slope. **Guardrail was added to the west side of the pump station, please refer to Sheet 6 for location.**
31. Note 7 refers to the Geotechnical Report by Oak Engineers dated February 27, 2007. The plan set and contract documents should clearly specify the contractor's responsibility to complete construction in accordance with the Geotechnical Report, as determined appropriate by NCS. **The geo-technical report is referenced to be part of the construction documents for this project.**

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32. The riverbank restoration slope appears to be in the range of 1.7H:1V to 2H:1V. These slopes are proposed to be stabilized with erosion control blanket and plantings. The geotechnical report, page 14 (Fill and Backfill section) states that permanent slopes steeper than 2H:1V should be stabilized with riprap, and that river banks should not exceed 2H:1V. The applicant should submit slope stability calculations for the proposed riverbank slopes. **The geo-technical engineer will perform the slope stability calculations and NCS will incorporate the recommendations in the final plans.**
33. Proposed storm drains are located within 4 to 8 feet of units 17, 18 and 19, with the proposed storm drain approximately 9 feet below proposed finish floor. There appear to be similar proposed conditions at other locations within the development. NCS should confirm that proposed pipe materials are suitable for installation at locations close to foundations where the proposed pipe may be located within the soil support zone below the proposed building foundations. Future storm drain maintenance implications should also be considered. **All building units within the pre-load area will be constructed on pilings and therefore foundation loads will not affect drainage pipes in this area. For the few locations where drainage pipes are in close proximity to spread footings the loads imparted will not affect the structural integrity of the culverts. Our geo-technical engineer (Paul Destefano, P.E., Oak Engineers) recommends that drainage pipes be placed 2-3 pipe diameters from the bottom of the footing. Since that criterium is met, ADS-N12 HDPE pipe is acceptable.**

Sheet 7 of 38, Grading & Drainage Plan – Sheet 3

34. The plan should include a note referring to the Depot Street Improvement Project, as on Sheet 6. **Notes have been added to all grading and drainage plans stating that the profile of the off-site improvements for Depot Street is a separate project. The plan and profile included in the plan set is for reference only. A separate plan set has been completed for the Depot Street Improvements and will not be part of the on-site contract.**

Sheet 8 of 38, Grading & Drainage Plan – Sheet 4

35. The plan shows a stabilized area (loam & seed over gravel) to access the DETENTION/FILTER system for maintenance. The Landscape Plan (L1) shows two proposed trees that appear to be within the access area. The access area should be kept clear of landscaping and other obstructions. **The landscape plan (L1) has been revised to allow for unimpeded access to the stormwater treatment area.**
36. The proposed 30-inch storm drain to the StormTech detention/filter system (pipe P-2) appears to be +/- 5 feet off the building foundation and below the level of the footing, based on the floor elevations noted. NSC should confirm suitability of proposed pipe materials for proposed installation near building foundations and below the footing-bearing zone (similar to comment #33). **Where drainage pipes are in close proximity to spread footings the loads imparted will not affect the structural integrity of the culverts. Our geo-technical engineer (Paul Destefano, P.E., Oak Engineers) recommends that drainage pipes be placed 2-3 pipe diameters from the bottom of the footing. Since that criterium is met, ADS-N12 HDPE pipe is acceptable.**
37. The bioretention cell behind unit #66 appears to be located within several feet of the proposed storm drain to the detention/filter system, with a bottom of under drain elevation near the top of the proposed storm drain. The design should be reviewed to provide adequate separation between the bioretention cell and the storm drain. **The under drain has been revised to eliminate the conflict with pipe p-2.**
38. This office recommends placement of cleanout risers at the ends of all under drain pipe runs for the bioretention cells. **Additional cleanout risers have been added to the plan as requested.**

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Sheet 11 of 38, Site Plan – Sheet 2

39. The barrier-free ramp at the northwest corner of the Sweetflag Drive/Lupine Lane intersection should be revised to align with the proposed crosswalk. **The ramp has been relocated to align with the crosswalk.**

Utility Plans, General Comments

40. We assume that NCS will coordinate electrical service and other wire utility locations with CMP and other utility companies and will show the approved locations on the final plans. **The location of roads have been fluid to this point, CMP has provided initial review and comment. They are currently reviewing a revised plan set. Their design will be incorporated in the final plans. Refer to the section 4 for a copy of correspondence with CMP.**
41. Underground utility services to the proposed buildings should be shown on the final construction drawings. **NCS does not believe that underground utility service locations should be shown as the amount of services would render the plan unreadable. All service details are on the detail sheet and will allow the contractor some flexibility in providing the services to each unit.**
42. The plans show several locations with proposed water lines and water valves located less than 5 feet away from proposed storm drainpipes and catch basin structures. We assume that NCS will coordinate with PWD to conform to their minimum pipe separation standards and all other PWD requirements. **NCS has previously met with PWD to review the preliminary layout and is in agreement with the layout. A follow up plan will be supplied to PWD for additional review.**
43. Gorrill-Palmer assumes that NCS will coordinate with the Windham Fire Department for approval of hydrant locations and sufficiency of proposed fire flows within the development. **The Fire Department has been actively involved in the layout of the hydrants and will continue to play an active role in the review of the project. A copy of the revised layout has been forwarded to the Fire Department please refer to Section 5.**
44. Utility Plan sheets 3 and 4 should include notes necessary to coordinate site work and utility construction with proposed reconstruction of the existing 36-inch storm drainpipe across the site from Depot Street to the river. We understand that the storm drain reconstruction plans are being prepared under separate contract to the Town and that NCS is coordinating site work design with the storm drain design by others. **Pine Tree Engineering has been retained by the Town to provide engineering design of the 36" drainage pipe that discharges into the Presumpscot River. A note has been added to all utility plans to coordinate the construction of the proposed site utilities with the construction of the 36" Town Drainage Pipe.**

Sheet 16 of 38, Utility Plan – Sheet 2

45. There appears to be an existing utility pole located within the proposed barrier-free ramp at the southeast corner of Depot Street & Trillium Drive. NCS should confirm that minimum required accessible route clearances are provided in accordance with ADA (Americans with Disability Act) Standards. **Relocation of overhead utility poles will be coordinated with the off-site improvement plans to insure proper clearances with the poles.**

Road, Sewer and Water Profiles – General Comments

46. The profiles appear to show 5.5 feet of cover on water lines and less than 1 foot of vertical separation from sewer lines at several locations. We assume that NCS will coordinate with

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PWD to meet their minimum pipe separation requirements. PWD has reviewed the preliminary layout and is in agreement with the layout. A follow up plan will be supplied to PWD for additional review.

Sheet 23 of 38, Erosion and Sedimentation Control Plan – Sheet 1

47. As noted in comment #25, a demolition phase erosion control plan should be included in the construction plan set. That plan, or a supplemental plan for the initial site grading and fill phase, should delineate the preload area and any necessary erosion control measures and should include necessary Best Management Practices (BMPs) to control sedimentation after demolition before the site is stabilized (such as stone check dams, sediment traps, sedimentation basins, etc.). **NCS disagrees and stands by the Erosion and Sedimentation Control Plan as shown on Sheet 23. The Construction Sequencing Notes explain the phasing of erosion controls on Sheet 24. This sequencing requires all erosion control measures to be in place prior to demolition.**
48. This plan shows silt fence across proposed storm drain outlets. Silt fence is not appropriate for sediment control at concentrated flow points; other BMPs should be specified for such locations. **Plunge pools have been added to the Erosion Control Plan in order to limit erosion at the pipe outlet locations for the bio-retention cells.**
49. The erosion control plans should refer to the riverbank stabilization details on Sheet 26 of the plan set. **A note has been added to the Erosion Control Plan, sheet 23, to refer to the riverbank stabilization detail.**
50. Slope stabilization requirements should be shown or noted on the erosion control plans. **The geo-technical engineer will perform the slope stability calculations and NCS will incorporate the recommendations in the final plans.**
51. The location of the construction fence should be coordinated with the grading plan in the area of the grading easement at the railroad ROW. **The location of the construction fence has been extended to encompass the entire scope of disturbed area along the railroad ROW.**

Sheet 24 of 38, Erosion and Sedimentation Control Notes

52. In general, the notes should be revised as necessary to incorporate provisions of the Erosion and Sedimentation Control narrative (Section 11) that apply to the construction phase. Some of the requirements stated in Section 11 do not appear to be included or appear to contradict the plan notes. These include stormwater diversion, dust control, slope stability and problem areas (Section 2.0); temporary non-structural measures (Section 3.0); permanent seed mixture (Section 4.0); and maintenance (Section 5.0). **The plan notes have been revised and now incorporate the information conveyed by the Erosion and Sediment Control narrative.**

Sheet 25 of 38, Erosion and Sedimentation Control Details

53. Additional erosion control details may be necessary to address the demolition and initial site grading phases of the project, such as stone check dam, sediment trap and sedimentation basin. **Additional erosion control details were added as requested.**

Sheet 26 of 38, Erosion and Sedimentation Control Details

54. The riverbank restoration plan view and profile should include notes that require construction in accordance with the project geotechnical recommendations. **The geo-technical engineer will perform slope stability calculations and NCS will incorporate the recommendations in the final approval plans.**
55. Design calculations for the proposed riprap installation at the base of the slope should be provided. Calculations should address applicable requirements from the geotechnical report as well as riverbank protection requirements for a specific design flood. **Riprap sizing calculations have been completed using HEC-11 nomograph, see Appendix O in Section**

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2. The riprap sizing used is oversized to provide a stable toe of slope and to insure that no erosion occurs during rain events where sheet flow runoff is flowing down the slope. This detail will be reviewed by the geo-technical engineer and design recommendations incorporated into the final plans.

Sheet 27 of 38, Underground Detention Details – Sheet 1

56. NCS should confirm the following design details for the detention/filter system with the StormTech manufacturer's representative:

- ◆ The filter cross-section shows the StormTech chambers wrapped in woven geotextile. Is this required for all rows of the proposed system? **The attached plan has been revised to show a single isolator row, rather than a series of rows. Consequently, the woven geotextile fabric will only be required at the single isolator row.**
- ◆ The detention/filter system layout does not appear to direct stormwater flows to a single isolator row as typically recommended by the manufacturer. **The attached plan has been revised to direct stormwater into a single isolator row.**
- ◆ We recommend that NCS confirm the size and specifications for the crushed stone material surrounding the chambers. **A copy of the plan has been forwarded to StormTech for review of the system configuration and material. A copy of the correspondence is included in the attached Section 9.**
- ◆ We recommend that NCS consider placement of geotextile material to separate the crushed stone chamber bedding and soil filter layers. **This geotextile requirement has been added to the filter cross-section.**
- ◆ It appears that additional cleanout/inspection ports are needed. **The attached plans have been revised to include additional inspection ports.**
- ◆ The impermeable liner should be shown on the filter cross section. **The impermeable liner specification has been added to the filter cross section on the attached planset.**

Sheet 29 of 38, Drainage & Construction Details

57. The typical pipe section should note the type of pipe. **The typical trench section now refers to ADS-N12, HDPE Pipe or approved equal.**
58. The precast concrete catch basin detail notes an RCP outlet pipe with a catch basin hood. Is RCP pipe proposed only for catch basin connections? If so, a detail for adapting to other types of storm drainpipe should be included. **All drainage pipe is to be ADS-N12, HDPE or approved equal.**
59. Are catch basin hoods proposed for all catch basins? **All catch basins are to be equipped with hoods as shown in the detail.**
60. A bioretention cell cleanout detail should be provided. **A cleanout detail has been added to the sheet.**

Sheet 33 of 38, Construction Details

61. A detectable warning strip conforming to ADA requirements should be added to the handicap ramp detail. **A detectable warning strip has been added to the Handicap ramp detail.**
62. A typical section for Depot Street reconstruction should be provided. **A typical section for Depot Street Improvements is not included in this plan set. All details and typical sections are included in the Off-Site Improvement Plan Set, which at this time is not part of this contract.**

Sheet 34 of 38 (S1), Proposed Retaining Wall Plan, Section, Elevations

63. Slope grading shown on the partial site plan does not appear to agree with the grading plan (Sheet 6 of 38). The partial site plan shows a top of slope elevation 112 and 2H:1V slopes, compared to the grading plan which shows top of slope elevation 114 and approximately

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1.7H:1V slopes, respectively. The plans should be revised accordingly. The grading has been coordinated with Oak Engineers and will be reflected in the final plans.

64. The extent of riprap shown on the elevation view does not appear to match the riprap detail shown on the riverbank protection detail (sheet 26 of 38). These two plans should be coordinated and revised accordingly. **The limits of riprap have been coordinated with Oak Engineers and will be reflected in the final plan. A meeting is being scheduled with all parties to determine further action on the off-site improvements.**

Sheet 38 of 38, Plan & Profile – Depot Street

This plan was included in this plan set for reference only, it has not been decided how, when or who is going to put this project out to bid. NCS has initiated the design of a plan set for Portland Water District (PWD) and improvements required for Village at Little Falls and AVESTA.

65. The plan view should show all proposed construction, including pavement saw cut locations, new pavement, limits of construction, proposed grades, fill slopes, etc. N/A
66. A note referring to the proposed site construction plans and requiring the contractor to coordinate construction with onsite work should be added to the plan. N/A
67. The plan should note that any existing ROW monuments or other survey markers disturbed by construction shall be reset by a Maine-licensed Land Surveyor in accordance with Town Standards. N/A
68. Any required alteration of existing catch basins, sanitary manholes, fire hydrants or other utility structures should be noted on the plans. N/A
69. The plan appears to show proposed sewer replacement extending south on a side street from manhole SMH-5. Limits of construction should be shown on the plan, or plans should be provided for construction extending beyond the limits of this plan sheet, if applicable. N/A

Traffic Review

Gorrill-Palmer reviewed the traffic study prepared by Bill Bray and dated March 2007. We also completed a site visit on June 2, 2007. The study was completed in accordance with current industry standard practice. We present the following comments for the applicant's consideration and response as appropriate:

1. We concur with the trip generation, traffic volume adjustments, and crash analysis. We would question the full occupancy date of 2009, but given the 1% annual adjustment to the background volumes, we would not expect that a study horizon several years later would affect the conclusions of the study. **Comment acknowledged**
2. The capacity analysis showed only one movement below level of service "D" out of the several intersections that were studied. This was the Chute Road westbound thru-left turn movement at River Road. The volumes indicate only 3 right turns out of Chute Road, which would not justify a separate turn lane. The volumes exiting Chute Road would not likely satisfy a signal warrant; therefore, the lower level of service is acceptable. **Comment acknowledged**
3. The study did not address the potential need for a left turn lane on River Road at Depot Street. Since the proposed project sends the majority of the site-generated traffic through this intersection, we suggest that a left turn warrant evaluation be provided. **In response to this comment, MDOT's Figure 8-19; Volume Warrants for Left-Turn Lanes at Unsignalized Intersections on 2-Lane Highways (40mph) was evaluated based upon estimated 2009 AM and PM and Post-Development traffic conditions. Figures 7 and 8 from the submitted traffic impact study (refer to attached copies) were used as the basis for assessing the need for a separate left-turn lane from westbound River Road. The respective values used for each peak hour condition are noted as follows:**

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AM Peak Hour

Va = 159 vehicles

Vo = 837 vehicles

Left turn % = 9% (14 left-turn vehicles)

PM Peak Hour

Va = 705

Vo = 250

Left-turn % = 5% (35 left-turn vehicles)

Attached for reference, is a copy of MDOT's Figure 8-19 that depicts the location of noted values for both peak hour conditions. Based upon the defined process a separate left-turn lane is warranted during the AM peak hour condition and is very minimally warranted for the PM peak hour time period. The 35 vehicles in the PM peak hour attempting to turn left from River Road to Depot Road are opposed by a total of 250 vehicles. The capacity analysis completed for the PM peak hour condition suggests that the highest or "best" level of service is maintained for the left-turn movement from River Road. Further, MDOT's 2002 through 2004 safety data for the intersection would suggest that the intersection is currently not experiencing a safety problem. It would be the opinion of the writer that a separate left-turn lane is not appropriate based upon projected post-development conditions.

4. The MaineDOT crash summary report should be provided for our review. A copy of the report is attached as requested.
5. The traffic study discusses only two driveways in the sight distance analysis. The plans show three driveways and an emergency vehicle access. The Depot Street Plan & Profile (Sheet 38 of 38) indicates that Depot Street will be reconstructed in the vicinity of Trillium Lane to achieve a minimum 250 feet of sight distance. Based on our field review and this plan, sight distances appear to be adequate. However, the applicant should clarify the driveway situation and provide their own assessment of the sight distances. The third full service driveway, an existing joint driveway with the Little Falls Landing project, was previously evaluated at the time of site plan approval and it was determined that sufficient vehicle sight distance could only be provided with major reconstruction of Depot Road. (A copy of the earlier evaluation letter, which is dated August 23, 2005, is attached for reference.) As a result of the earlier recommendation, Depot Road will be reconstructed concurrent with development of the proposed Little Falls housing project to provide a minimum of 250-feet of sight distance, which meets MDOT's standard for a posted speed limit of 30mph.

NCS has also revised all road profiles at intersections to 3% or less.

Sincerely,
Northeast Civil Solutions, Inc.



Lee Allen P.E.
Vice President

Enc.

Copy: Steve Etzel, HRC
Bill Bray, P.E., Traffic Solutions
Charlotte Maloney, Gawron Turgeon Architects
Paul Destefano, P.E., Oak Engineers
Larry Bastian, P.E., Gorrill-Palmer

VIL_RESP03044

STORMWATER MANAGEMENT NARRATIVE

VILLAGE AT LITTLE FALLS

Route 202
Tax Map 38, Parcels 6&7
Windham, Maine

Prepared For:
HRC – Village at Little Falls, LLC
2 Market Street
Portland, Maine 04101

Revised July 11, 2007



Prepared by:
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29522

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APPENDICES

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STORMWATER MANAGEMENT NARRATIVE

VILLAGE AT LITTLE FALLS

Route 202
Tax Map 38, Parcels 6&7
Windham, Maine

Prepared For:
HRC – Village at Little Falls, LLC
2 Market Street
Portland, Maine 04101

Revised July 11, 2007


Prepared by:
Northeast Civil Solutions, Inc.
153 U.S. Route 1
Scarborough, ME 04074

29522

VIL_RESP03048

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1. INTRODUCTION

The proposed Village at Little Falls development consists of 82 new residential condominium units with associated paved streets, landscaping, driveways, utilities, and stormwater management infrastructure. The project will include a 16-unit apartment building, 18 cottage style units, 14 porch style units, 33 townhouse units, and a single-family residence. The 8.03-acre property is located in Windham, Maine at the corner of Route 202 and Depot Street. The property has approximately 370 feet of frontage on the Presumpscot River.

The site formerly housed a pulp mill that was later transformed into a steel mill. The mill was abandoned in the late 1980's; and currently, the mill is in a state of disrepair. The mill is located along the Presumpscot River and is constructed on a pile type foundation to allow the river to flow under the western end of the building. It is speculated that this end of the building originally housed a turbine to generate its own electricity. Just to the east of the project site lies the rail bed of the Maine Central Railroad, tracks and ties were removed approximately 1 year ago. A cross culvert discharges flow onto the site near the intersection of the rail bed with Depot Street. The discharge from this culvert has formed a man-made channel that meanders 300' through the site before disappearing below grade. It is believed that the channel flows beneath the mill before discharging into the Presumpscot River.

The proposed project is designed to satisfy the DEP's Basic and General Standards. The applicant is requesting a waiver of the Flooding Standards for this project. The increase in peak flow from the site will not significantly affect the peak flow of the river or adversely impact areas downstream of the development. The Presumpscot River is not an urban impaired stream, therefore urban impaired stream standards do not apply.

2. STUDY METHODOLOGY

In this study, the Soil Conservation Services Urban Hydrology for Small watersheds, Technical Release 20 (also known as SCS-TR20) was utilized to model the surface water drainage patterns for the pre and post development drainage conditions. HydroCAD Stormwater Modeling System Software (Version 6) was used for the SCS TR20 calculations. The SCS TR-55 method was used to estimate the Time of Concentration (T_c). This method involves estimating the length of sheet flow, shallow concentrated flow and channel flow that occurs within each subcatchment. Each T_c Path and corresponding length and slope is identified in the pre and post development drainage area plan. From this information, the time of concentration is determined for each watershed. Modeling was conducted using the 2, 10, and 25-year storm events.

The curve numbers (CN) utilized in this analysis relate to the ground cover that was observed on the site. The following curve numbers were used.

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Table 1 – Summary of Curve Numbers

Description	Hyd B	Hyd C	Hyd D
Pavement/Roofs	98	98	98
Pasture/Grass, Fair	69	79	84
Pasture/Grass, Good	61	74	80
Brush, Good	56	65	73

The proposed closed drainage system was designed using Heasted Method's StormCAD software. StormCAD utilizes the Rational Method to calculate runoff rates to each catch basin. Manning's Equation is used to calculate pipe flow properties. The closed drainage system was designed using a 10-year storm. The subcatchment areas and associated Rational Method coefficients are shown on the attached Pipe Sizing Plan. The Rational Method Calculations are included in Appendix A.

3. OFF-SITE DRAINAGE

Two existing culverts discharge stormwater from abutting properties onto the project site. An 18" corrugated metal pipe provides drainage for the eastern abutter. Similarly, the output from an abutting underground detention system flows onto the site near the western boundary. In both cases, the stormwater was directed into the development's proposed catchbasin system.

The offsite subcatchment for the eastern abutter was calculated based upon USGS Topographical maps for the area. A copy of this map with the subcatchment delineation is provided in Appendix B. The stormwater flow from this subcatchment is directed into an existing 18" stormwater culvert. The maximum flow capacity of this culvert was calculated based upon Manning's Equation. A copy of the capacity calculation is attached in Appendix B. This maximum flow capacity of the pipe was incorporated into the HydroCAD and StormCAD models.

The stormwater discharge from the abutting Little Falls Landing apartment building is also included in the system modeling calculations. The previously approved HydroCAD model for the abutter's existing drainage system was included in the attached model for the Village at Little Falls project. The flow from this system is less than 0.5 cfs and therefore does not have a significant impact on the proposed development.

4. PRE-DEVELOPMENT CONDITIONS

Soil boundaries were taken from the Cumberland County SCS Soil Maps. The following soils were encountered on the site:

- Cu – Undorthents – Hydrologic Soil Group C
- HrB – Hollis Fine Sandy Loam – Hydrologic Soil Group C
- Py – Podunk Fine Sandy Loam – Hydrologic Soil Group B
- HfD2 – Hartland Very Fine Sandy Loam – Hydrologic Soil Group B
- Sn – Scantic Silt Loam – Hydrologic Soil Group D

Under pre-development conditions the site is modeled as a single drainage area. Additional information regarding this subcatchment is shown on the attached Pre-Development Drainage Plan.

The Pre-Development Drainage Area encompasses approximately 9.62 acres and is composed of gravel drives, pavement, roofs, and grass. Water drains towards the southwest, under the western portion of the mill and into the Presumpscot River.

Table 2, found below summarizes the Pre-Development flow that is discharged from this site during the 2, 10, and 25-year storm events. Please refer to Appendix C for HydroCAD calculations of the Pre-Development discharge rates.

Table 2 – Summary of Pre-Development Discharges

Analysis Point	HydroCAD Node	Discharges (cfs)		
		Q ₂	Q ₁₀	Q ₂₅
1	1L	15.3	28.8	35.5

5. POST DEVELOPMENT CONDITIONS

The proposed development results in the addition 3.1 acres of impervious area to the site. Due to the increase in impervious areas the peak flow of runoff also increases. However, the proposed underground detention system will offset this increase. Consequently, Post-Development drainage rates are equal to or less than the existing discharge rates. Under Post Development conditions, the site is broken into two drainage areas.

Drainage Area V1

This area is approximately 6.5 acres in size and is comprised of pavement, roofs, and lawn. Stormwater drains along the curblin and into the proposed catchbasin system. The discharge from the catchbasin system is filtered and cooled in a subsurface soil filter prior to discharge into the Presumpscot River.

Drainage Area V2

This area is approximately 2.7 acres in size and is located along the shore of the Presumpscot River. The stormwater run-off from the cottages in this area will be treated by the proposed Bio-Retention Cells prior to discharge into the Presumpscot. The shoreline will be restored to a natural vegetative state after the removal of the mill building. The area of restoration is shown on the attached grading plan.

Table 3, found below summarizes the Post-Development flow that is discharged from this site during the 2, 10, and 25-year storm events. Please refer to Appendix C for HydroCAD calculations of the Post-Development discharge rates.

Table 3 – Summary of Post Development Discharges with Storage

Analysis Point	HydroCAD Node	Discharges (cfs)		
		Q ₂	Q ₁₀	Q ₂₅
1	1L	13.4	37.8	45.1

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The following table compares the total pre-development flows to the post development discharge for the 2, 10, and 25-year storm events.

Table 4 – Comparison of Pre and Post Development Discharges for Analysis Point 1

Return Period	Point 1 Pre Flows (cfs)	Point 1 Post Flows (cfs)	Diff. (cfs)
2	15.3	13.4	-1.9
10	28.8	37.8	9.0
25	35.5	45.1	9.6

The post development discharge rate for the 2-year storm event is less than the existing rate. However, the post development rates for the 10 and 25-year storm events are greater than the existing rates. This increase in peak flow from the site will not significantly affect the peak flow of the river or adversely impact areas downstream of the development. Further information regarding the Flooding Standards is found in Section 7.0.

6. GENERAL STANDARD BMP REQUIREMENTS

After the proposed development, the total impervious area onsite will be approximately 4.46 acres, the total developed area will be approximately 7.33 acres, and the total disturbed area will be approximately 7.6 acres. The lot size is approximately 8.03 acres.

The following table summarizes the stormwater control requirements for the proposed development.

Table 5– Summary of Control Requirements

Area Type	Total Area on Site	Area Controlled by Structural Measures	% Area Controlled
Impervious	194,416 sqft	192,348 sqft	98%
Developed	319,464 sqft	269,425 sqft	84%

The DEP General Standards require that 95% of the impervious area and 80% of the developed area be treated. By examination of Table 5, the proposed treatment system will satisfy both of these requirements. Please refer to Appendix D for treatment level calculations and plans.

Treatment will be provided by a combination of bio-retention cells and a subsurface foil filter. In each case, the water quality volume (WQV) was determined by 1" runoff from the impervious area and 0.4" runoff from the landscaped area.

A subsurface soil filter will treat and cool the stormwater from subcatchment V1 prior to discharge into the Presumpscot River. The filtration will take place in a subsurface soil filter. Pretreatment will be provided by 10 Stormtech Isolator Rows. All chambers will

wrapped in geotextile fabric in order to capture sediment prior to discharge into the filtration system. In addition, all catchbasins will be equipped with a catch basin hood; thus helping to attenuate hydrocarbons within the system. The system was designed to drain between the time of 24 and 48 hours. Please refer to Appendix E for subsurface soil filter calculations.

Bio-retention cells will treat the stormwater from the cottages in the V2 subcatchment. The cells were sized to accommodate the water quality volume of 1" times the impervious area plus 0.4" times the landscaped area. In addition, each bio-retention cell will have a minimum surface area of 0.05 times the impervious area plus 0.02 times the landscaped area. Please refer to Appendix F for bio-retention cell calculations.

The soil investigation report prepared by Oak Engineers indicates that the groundwater elevation is between 88 and 94 feet in the area of the filters. This elevation is well below of the bottom of the proposed treatment system.

Riprap is proposed at the discharge of the treatment system in order to protect the area from erosion. The riprap will have a D_{50} size of 8". The outlet protection calculations are included in Appendix H. Details of the outlet protection areas are included in the attached planset.

7. FLOODING STANDARDS

The project site is located immediately adjacent to the Presumpscot River. Currently runoff flows directly off the site and into the river. In the post development condition all stormwater will be treated prior to discharge into the river. It is common engineering practice in sites adjacent to large watercourses to treat and discharge stormwater as quickly as possible so that the peak site discharge does coincide with the peak of the watercourse. Since the watershed of the Presumpscot River is 577 square miles and includes Sebago Lake it is safe to assume that the peak discharge from the site occurs well in advance of the peak of the watershed.

8. MAINTENANCE PLAN

A Homeowners Association will be responsible for the maintenance of all stormwater management structures, the establishment of any contract services required, and the keeping of records and maintenance logbook. The maintenance contractor will be responsible for inspecting and performing maintenance in accordance with the Maine DEP approved Maintenance Plan as well as the manufacturer's recommended maintenance plans. The contract with Clean Harbors is included in Appendix I. At a minimum, the appropriate and relevant activities for each of the stormwater management facilities will be performed on the prescribed schedule.

A sample of the Maintenance Log is included in Appendix J. Records of all inspections and maintenance work accomplished must be kept on file and retained for a minimum 5-

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year time span. The maintenance logbook shall be made available to the DEP upon request.

Sweeping

Paved surfaces shall be swept or vacuumed at least twice annually in the spring to remove all winter sand, and periodically during the year on an as-needed basis to minimize transportation of sediment during rainfall events.

Closed Drainage Structures, Catchbasins and Outlet Control Structures

Catch basins sumps shall be inspected in the spring and periodically during the year on an as-needed basis. If the catch basin sump has more than 1' of accumulation, remove sediment via a vacuum truck or any mechanical means. Care should be taken to not flush the sediments into the underdrain soil filters or retention systems as it will reduce the system's capacity and hasten the time when it must be cleaned.

If sediment in culverts or piped drainage systems exceeds 20% of the diameter of the pipe, it should be removed. This may be accomplished by hydraulic flushing or any mechanical means. All pipes should be inspected on an annual basis.

Underground Detention System

The underground detention system will be maintained per the manufacture's recommendations.

The underground detention system will need to be inspected annually, with the initial inspection occurring 6 months after installation. If sediment is found during the visual inspection, a stadia rod should be inserted to determine the depth of sediment. If the depth of sediment exceeds 3 inches, the system should be cleaned using a vacuum process.

A signed contract for the maintenance of the isolator row will be forwarded to the Department of Environmental Protection prior to the occupancy of any building.

Soil Filter Inspection

The soil filter should be inspected after every major storm in the first few months to ensure proper function. Thereafter, the filter should be inspected at least once every six months to ensure that it is draining within 48 hours; and that, after storms that fill the system to overflow, it drains in no less than 24 hours. Sediment and debris should be removed from the pretreatment structure at least annually.

Bio-Retention Cell Inspection

The bio-retention cells will be inspected annually. Fertilization of the underdrained filter area should be avoided unless absolutely necessary to establish vegetation.

and pruning of excessive growth will occasionally be needed. Weeding to control unwanted or invasive plants may also be necessary. Add new mulch as necessary.

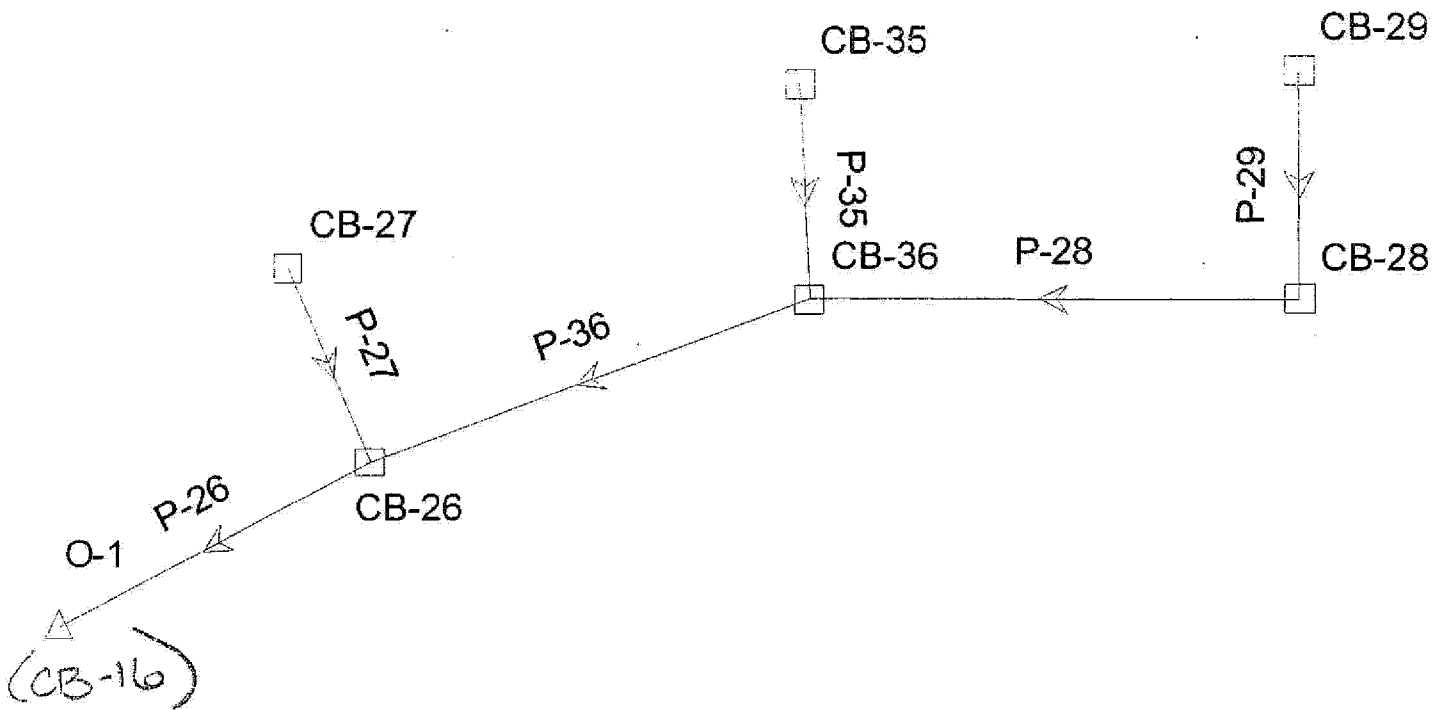
9. CONSTRUCTION QUALITY ASSURANCE

The applicant will retain the services of a professional engineer to inspect the construction and stabilization of the underdrained soil filters. Inspections shall consist of weekly visits to the site to inspect each the underdrained soil filter's underdrain construction, filter material placement, level lip spreader overflow from initial ground disturbance to final stabilization of the filter. If necessary, the inspecting engineer will interpret the underdrained soil filter's location construction plan for the contractor. Once the underdrained soil filter is constructed and stabilized, the inspecting engineer will notify the department in writing within 14 days to state that the filter has been completed.

Accompanying the engineer's notification must be a log of the engineer's inspections giving the date of each inspection, the time of each inspection, the items inspected on each visit, and include any testing data or sieve analysis data of the filter media. An inspection of the underdrained soil filter shall also be performed by a professional engineer one year after the final stabilization of the filter. The engineer will notify the department as to the filter's effectiveness and determine any maintenance items that are needed.

Appendix A
Pipe Sizing Calculations

Scenario: Base

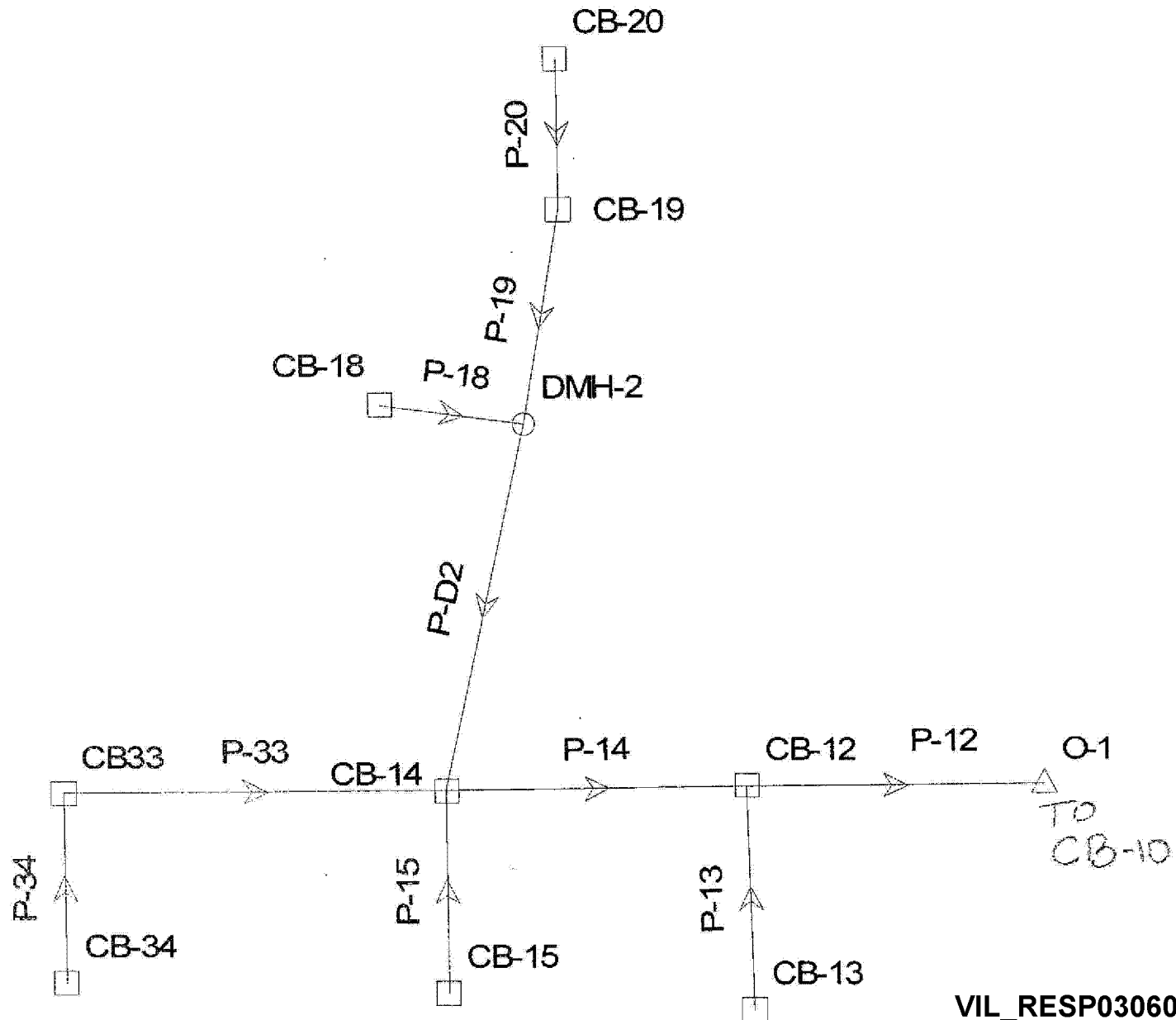


Scenario: Base

Combined Pipe\Node Report

Label	Upstream Node	Downstream Node	Length (ft)	Section Size	Average Velocity (ft/s)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Constructed Slope (ft/ft)	System CA (ft²)	System Intensity (in/hr)	Total Flow (cfs)	Full Capacity (cfs)	System Additional Flow (cfs)
P-27	CB-27	CB-26	14.00	12 inch	3.34	109.52	109.45	0.005000	9,571	5.30	1.17	2.73	0.00
P-35	CB-35	CB-36	14.00	12 inch	2.63	114.00	113.86	0.010000	1,724	5.30	0.21	3.86	0.00
P-29	CB-29	CB-28	14.00	12 inch	3.49	118.90	118.75	0.010714	4,149	5.30	0.51	3.99	0.00
P-28	CB-28	CB-36	151.00	12 inch	7.92	118.65	113.50	0.034106	17,399	5.29	2.13	7.13	0.00
P-36	CB-36	CB-26	179.00	18 inch	6.84	113.00	109.45	0.019832	23,457	5.23	2.84	16.02	0.00
P-26	CB-26	O-1	96.00	18 inch	4.81	109.35	108.87	0.005000	42,450	5.16	5.07	8.05	0.00

Scenario: Base



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Project Engineer: Denise Cameron

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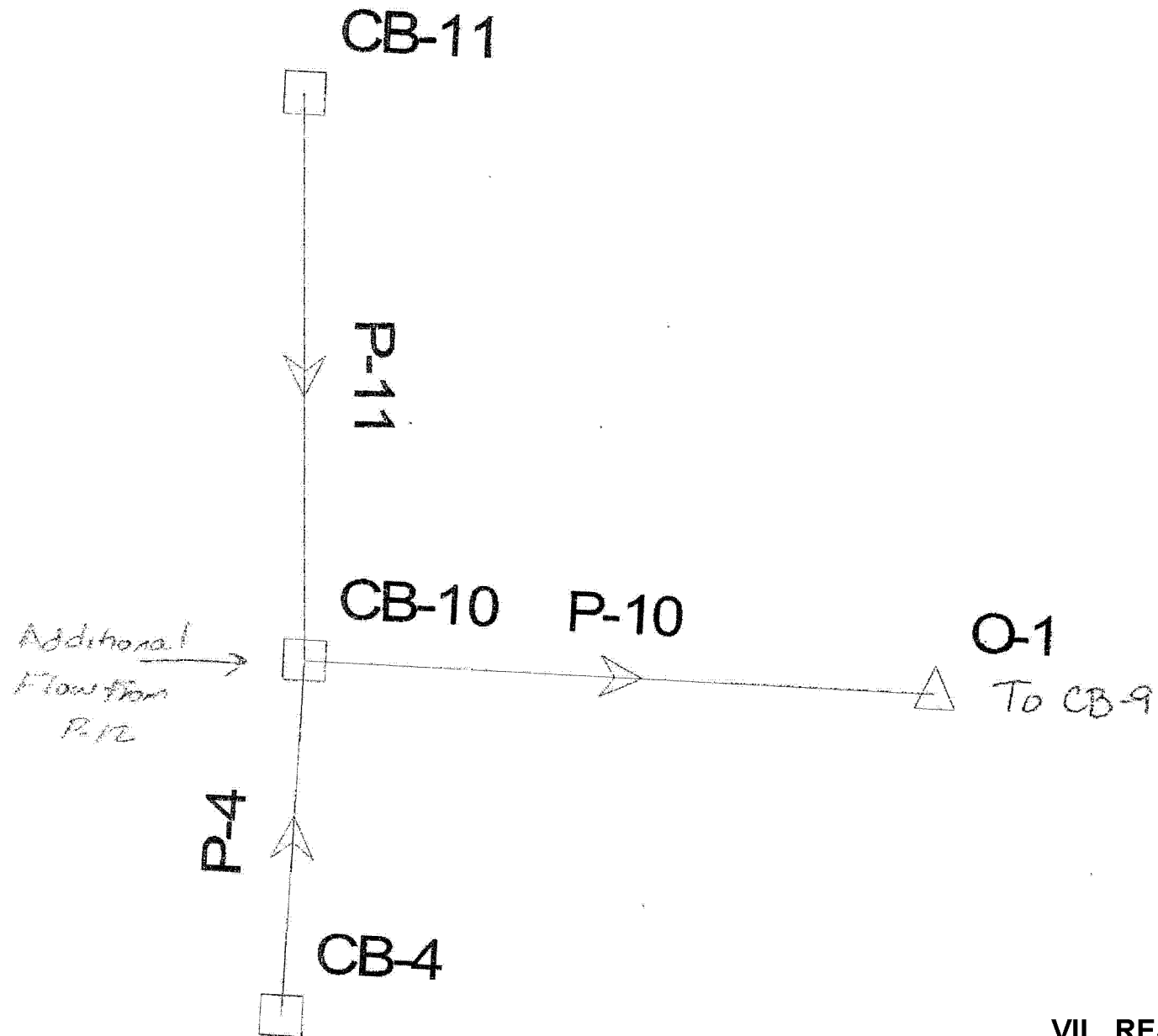
Scenario: Base

Combined Pipe\Node Report

Label	Upstream Node	Downstream Node	Length (ft)	Section Size	Average Velocity (ft/s)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Constructed Slope (ft/ft)	System CA (ft²)	System Intensity (ln/hr)	Total Flow (cfs)	Full Capacity (cfs)	System Additional Flow (cfs)
P-14	CB-14	CB-12	31.00	18 inch	6.64	107.89	107.58	0.010000	53,703	5.18	6.43	11.38	0.00
P-15	CB-15	CB-14	26.00	12 inch	3.41	109.36	109.23	0.005000	10,285	5.30	1.26	2.73	0.00
P-13	CB-13	CB-12	26.00	12 inch	3.22	108.80	108.67	0.005000	8,282	5.30	1.02	2.73	0.00
P-12	CB-12	O-1	62.00	24 inch	8.18	107.08	106.15	0.015000	69,761	5.16	8.33	30.01	0.00
P-33	CB33	CB-14	86.00	12 inch	4.34	109.78	109.23	0.006395	19,499	5.28	2.38	3.09	0.00
P-20	CB-20	CB-19	22.00	12 inch	2.59	120.11	120.00	0.005000	3,773	5.30	0.46	2.73	0.00
P-19	CB-19	DMH-2	100.00	12 inch	6.96	119.90	114.48	0.054200	6,207	5.28	0.76	8.99	0.00
P-18	CB-18	DMH-2	44.00	12 inch	3.05	114.70	114.48	0.005000	6,750	5.30	0.83	2.73	0.00
P-D2	DMH-2	CB-14	152.00	12 inch	7.26	114.38	109.23	0.033882	12,957	5.24	1.57	7.10	0.00
P-34	CB-34	CB33	24.00	12 inch	3.37	110.00	109.88	0.005000	9,865	5.30	1.21	2.73	0.00

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Scenario: Base



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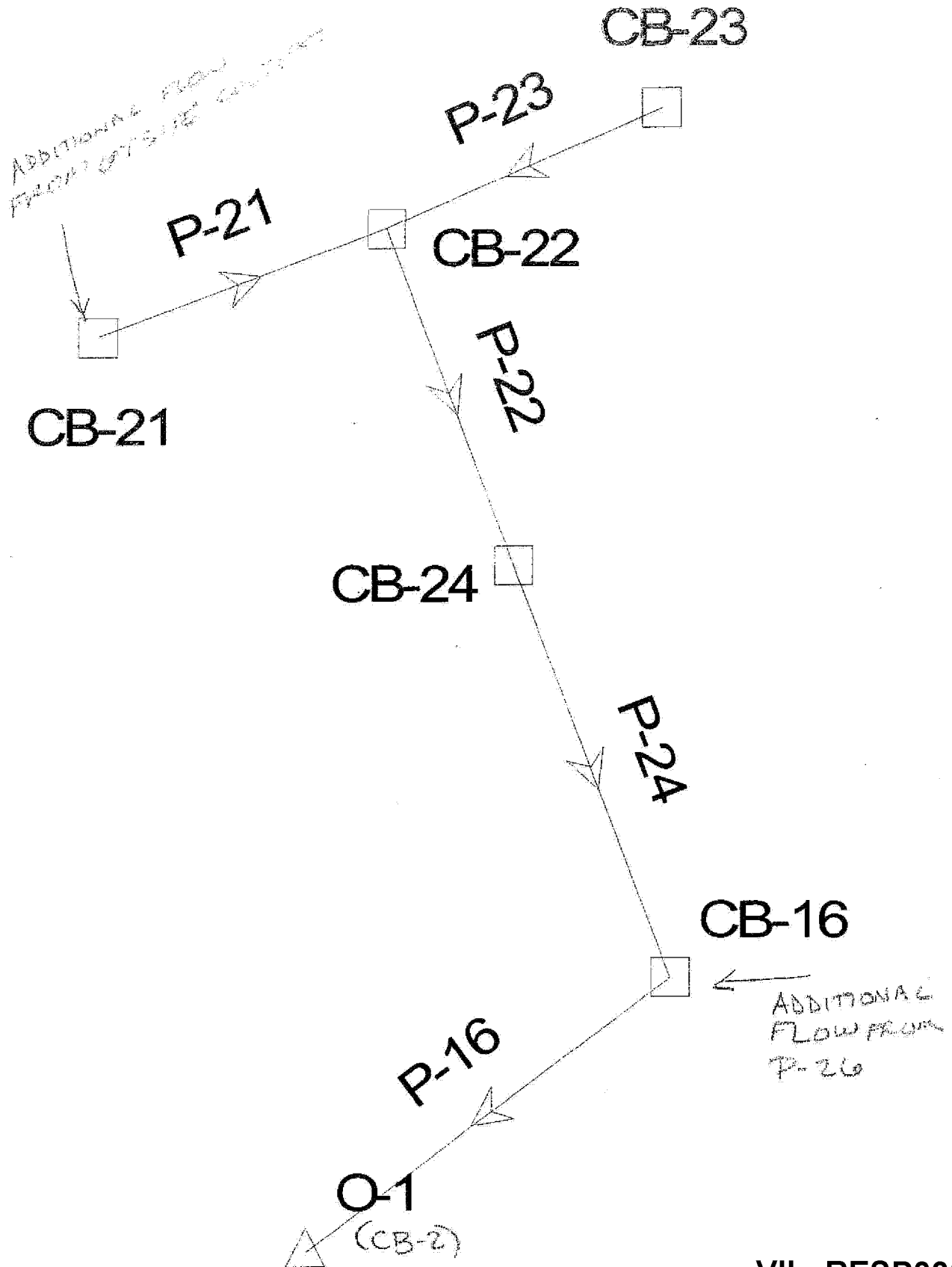
Scenario: Base

Combined Pipe\Node Report

Label	Upstream Node	Downstream Node	Length (ft)	Section Size	Average Velocity (ft/s)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Constructed Slope (ft/ft)	System CA (ft²)	System Intensity (in/hr)	Total Flow (cfs)	Full Capacity (cfs)	System Additional Flow (cfs)
P-10	CB-10	O-1	73.00	24 inch	9.53	106.15	104.80	0.018493	22,516	5.23	11.06	33.33	8.33
P-11	CB-11	CB-10	93.00	12 inch	3.80	106.83	106.25	0.006237	11,485	5.30	1.41	3.05	0.00
P-4	CB-4	CB-10	71.00	12 inch	3.29	106.60	106.25	0.004930	9,186	5.30	1.13	2.71	0.00

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Scenario: Base



Scenario: Base

Combined Pipe\Node Report

Label	Upstream Node	Downstream Node	Length (ft)	Section Size	Average Velocity (ft/s)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Constructed Slope (ft/ft)	System CA (ft²)	System Intensity (in/hr)	Total Flow (cfs)	Full Capacity (cfs)	System Additional Flow (cfs)
P-16	CB-16	O-1	24.00	24 inch	6.03	108.37	108.25	0.005000	16,391	5.22	12.77	17.33	10.79
P-23	CB-23	CB-22	33.00	18 inch	2.40	110.50	110.33	0.005152	3,294	5.30	0.40	8.17	0.00
P-22	CB-22	CB-24	53.00	18 inch	5.29	110.23	109.95	0.005283	13,835	5.26	7.40	8.27	5.72
P-24	CB-24	CB-16	53.00	18 inch	8.73	109.85	108.87	0.018491	15,941	5.23	7.65	15.47	5.72
P-21	CB-21	CB-22	15.00	18 inch	5.20	112.60	112.52	0.005333	6,468	5.30	6.51	8.31	5.72

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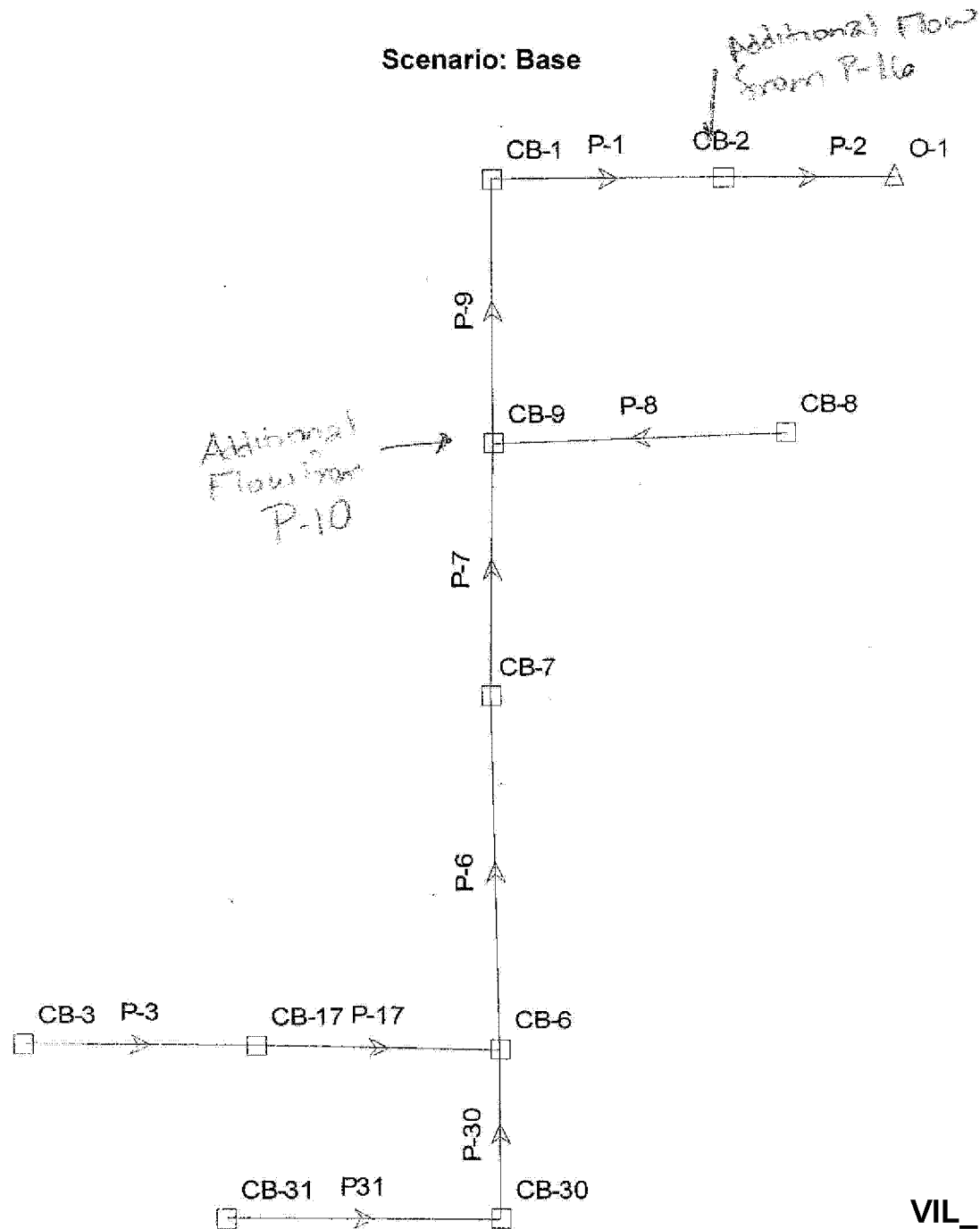
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Project Engineer: Denise Cameron

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Scenario: Base



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Scenario: Base

Combined Pipe\Node Report

Label	Upstream Node	Downstream Node	Length (ft)	Section Size	Average Velocity (ft/s)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Constructed Slope (ft/ft)	System CA (ft²)	System Intensity (in/hr)	Total Flow (cfs)	Full Capacity (cfs)	System Additional Flow (cfs)
P-6	CB-6	CB-7	217.00	18 inch	5.82	107.82	105.40	0.011152	24,817	5.19	3.34	12.02	0.36
P-7	CB-7	CB-9	36.00	18 inch	4.66	105.40	105.22	0.005000	34,573	5.09	4.43	8.05	0.36
P-9	CB-9	CB-1	99.00	24 inch	6.82	104.70	104.11	0.005960	48,911	5.06	17.15	18.92	11.42
P-1	CB-1	CB-2	14.00	24 inch	7.07	104.00	103.91	0.006429	53,018	5.02	17.58	19.65	11.42
P-2	CB-2	O-1	73.00	30 inch	8.37	103.40	102.90	0.006849	53,548	5.02	30.41	36.77	24.19
P-30	CB-30	CB-6	44.00	12 inch	3.95	108.54	108.32	0.005000	18,262	5.29	2.60	2.73	0.36
P31	CB-31	CB-30	12.00	12 inch	3.51	108.70	108.64	0.005000	8,622	5.30	1.42	2.73	0.36
P-3	CB-3	CB-17	151.00	12 inch	4.67	117.20	110.30	0.045695	1,975	5.30	0.24	8.25	0.00
P-17	CB-17	CB-6	19.00	12 inch	3.07	110.20	110.00	0.010526	2,774	5.21	0.33	3.96	0.00
P-8	CB-8	CB-9	23.00	12 inch	4.20	106.35	106.12	0.010000	8,713	5.30	1.07	3.86	0.00

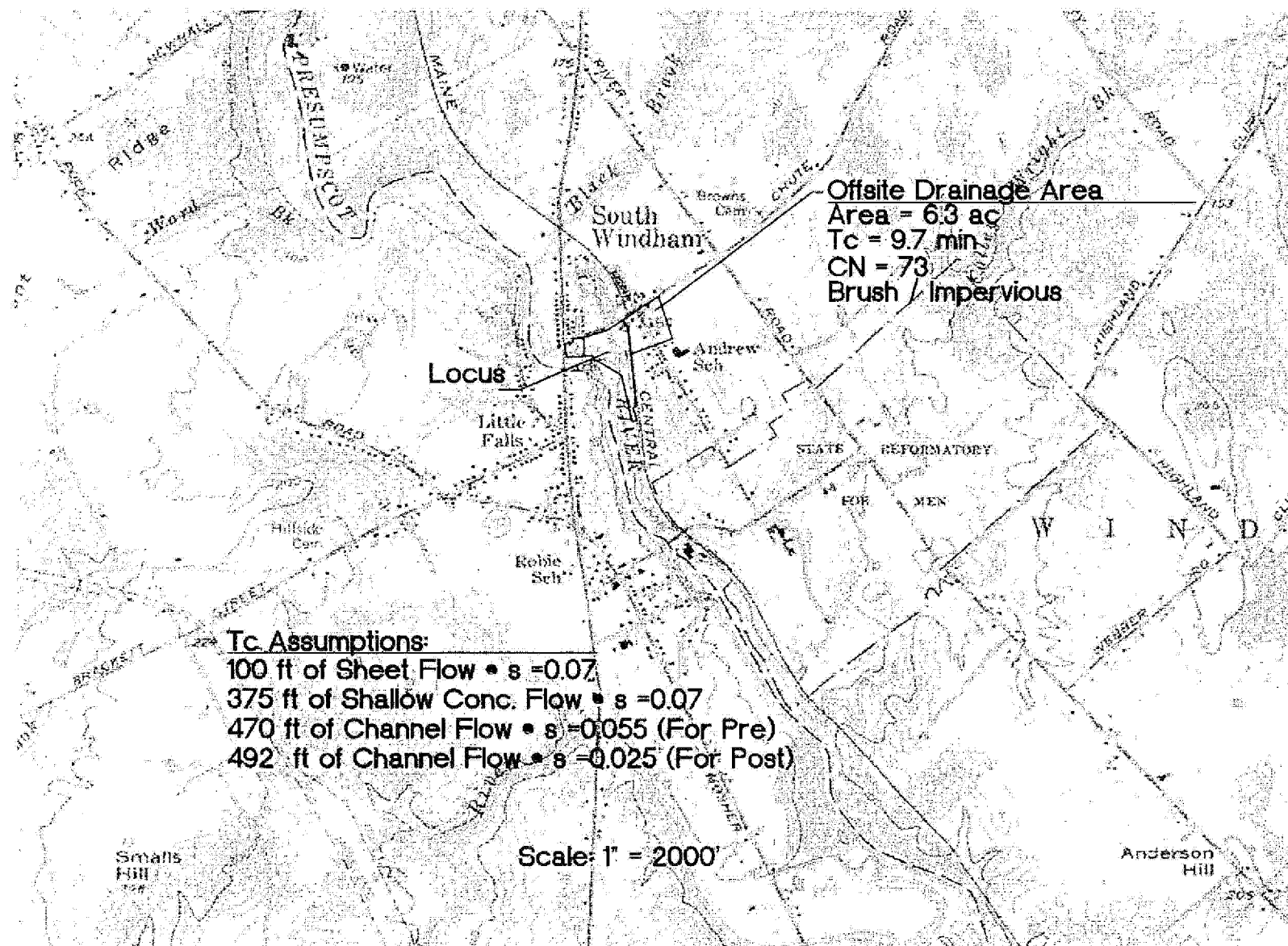
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Project Engineer: Denise Cameron
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Appendix B
Offsite Drainage Area



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NORTHEAST CIVIL SOLUTIONS, INC.

Surveying Engineering Land Planning

53 U.S. Route 1, Scarborough, Maine 04074

Tel: 207-883-1000 • Fax: 207-883-1001

PROJECT

SHEET NO.

OF

CALCULATED BY

DATE

CHECKED BY

DATE

SCALE

DISCHARGE FROM EXISTING 18" CMP CULVERT
LOCATED AT EASTERN PROPERTY LINE
SERVICING OFF SITE DRAINAGE

FIND CAPACITY OF EXISTING CULVERT FLOWING FULL

$$Q = \frac{1.49}{7.48} (A) (R)^{2/3} \sqrt{S}$$

Assume Slope = 0.01 ft/ft

n for CMP = 0.024

$$A = \pi r^2 = \pi (0.75)^2 = 1.77 \text{ ft}^2$$

$$P = \pi d = 3.14 (1.5) = 4.71 \text{ ft}$$

$$\frac{A}{P} = \frac{1.77}{4.71} = 0.376'$$

$$Q = \frac{1.49}{0.024} (1.77) (0.376)^{2/3} \sqrt{0.01}$$

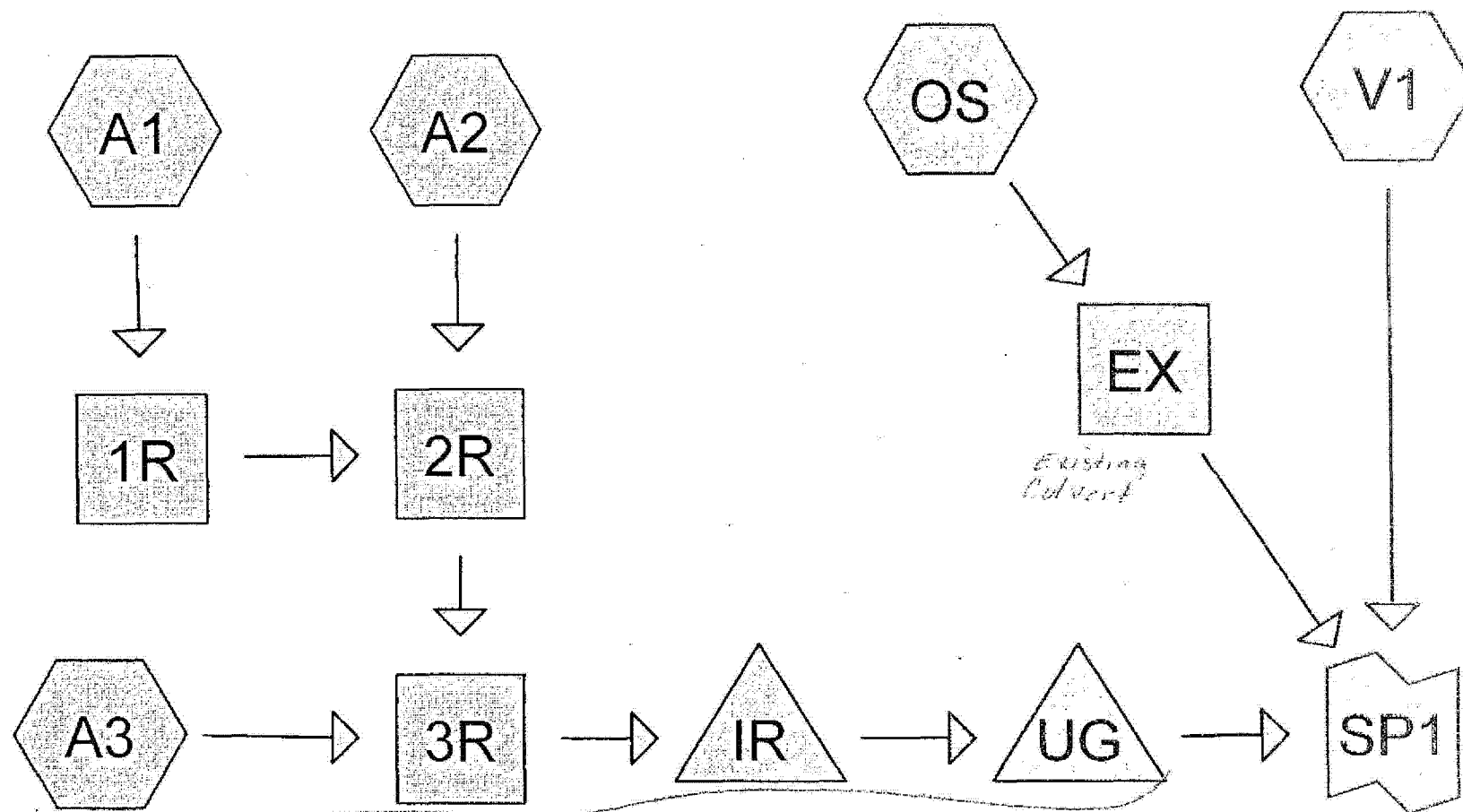
$$Q = 5.72 \text{ cfs}$$

The flow of 5.72 cfs will be added to CB-23.

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Appendix C
HydroCAD Calculations

Offsite Drainage from
Easterly Abutter
(See Appendix B)



Drainage Diagram for PRE DRAINAGE 05-29-07
 Prepared by Northeast Civil Solutions, Inc. 5/30/2007
 HydroCAD® 6.10 s/n 002173 © 1986-2002 Applied Microcomputer Systems

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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS, Type III 24-hr Rainfall=3.00"

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A1: AVESTA SUBCATCHMENT A1 Runoff Area=19,288 sf Runoff Depth=1.98"
Length=70' Tc=4.1 min CN=90 Runoff= 1.09 cfs 0.073 af

Subcatchment A2: AVESTA SUBCATCHMENT A2 Runoff Area=7,545 sf Runoff Depth=1.98"
Length=40' Tc=0.6 min CN=90 Runoff= 0.48 cfs 0.029 af

Subcatchment A3: AVESTA SUBCATCHMENT A3 Runoff Area=3,222 sf Runoff Depth=2.77"
Length=22' Tc=0.2 min CN=98 Runoff= 0.26 cfs 0.017 af

Subcatchment OS: Off Site Drainage Runoff Area=274,428 sf Runoff Depth=0.86"
Length=945' Tc=9.7 min CN=73 Runoff= 5.11 cfs 0.450 af

Subcatchment V1: VLF SUBCATCHMENT 1 Runoff Area=419,184 sf Runoff Depth=1.13"
Length=700' Tc=11.7 min CN=78 Runoff= 10.21 cfs 0.905 af

Reach 1R: Avesta Reach 1 Peak Depth= 0.44' Max Vel= 3.3 fps Inflow= 1.09 cfs 0.073 af
D=12.0" n=0.012 L=88.0' S=0.0050 '/' Capacity=2.73 cfs Outflow= 1.09 cfs 0.073 af

Reach 2R: Avesta Reach 2 Peak Depth= 0.42' Max Vel= 4.6 fps Inflow= 1.42 cfs 0.102 af
D=12.0" n=0.012 L=45.0' S=0.0102 '/' Capacity=3.90 cfs Outflow= 1.42 cfs 0.102 af

Reach 3R: Avesta Reach 3 Peak Depth= 0.33' Max Vel= 6.9 fps Inflow= 1.59 cfs 0.119 af
D=12.0" n=0.012 L=86.0' S=0.0294 '/' Capacity=6.62 cfs Outflow= 1.58 cfs 0.119 af

Reach EX: EXISTING CULVERT Peak Depth= 1.11' Max Vel= 3.6 fps Inflow= 5.11 cfs 0.450 af
D=18.0" n=0.024 L=45.0' S=0.0100 '/' Capacity=5.69 cfs Outflow= 5.10 cfs 0.450 af

Pond IR: Avesta Isolator Row Peak Storage= 1,053 cf @ 113.77' Inflow= 1.58 cfs 0.119 af
Primary= 1.59 cfs 0.095 af Outflow= 1.59 cfs 0.095 af

Pond UG: Avesta Underground Storage Peak Storage= 2,279 cf @ 111.27' Inflow= 1.59 cfs 0.095 af
Primary= 0.09 cfs 0.074 af Outflow= 0.09 cfs 0.074 af

Link SP1: Analysis Point 4 Inflow= 15.32 cfs 1.429 af
Primary= 15.32 cfs 1.429 af

Total Runoff Area = 16.613 ac Runoff Volume = 1.474 af Average Runoff Depth = 1.06"

Subcatchment A1: AVESTA SUBCATCHMENT A1

Runoff = 1.09 cfs @ 12.06 hrs, Volume= 0.073 af, Depth= 1.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=3.00"

Area (sf)	CN	Description
12,589	98	Paved parking & roofs
6,699	74	>75% Grass cover, Good, HSG C
19,288	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	20	0.0300	0.1		Sheet Flow, A TO B
					Grass: Dense n= 0.240 P2= 3.00"
0.6	50	0.0050	1.4		Shallow Concentrated Flow, B TO C
					Paved Kv= 20.3 fps
4.1	70	Total			

Subcatchment A2: AVESTA SUBCATCHMENT A2

Runoff = 0.48 cfs @ 12.01 hrs, Volume= 0.029 af, Depth= 1.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=3.00"

Area (sf)	CN	Description
2,637	74	>75% Grass cover, Good, HSG C
4,908	98	Paved parking & roofs
7,545	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	40	0.0175	1.1		Sheet Flow, A TO B
					Smooth surfaces n= 0.011 P2= 3.00"

Subcatchment A3: AVESTA SUBCATCHMENT A3

Runoff = 0.26 cfs @ 12.00 hrs, Volume= 0.017 af, Depth= 2.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=3.00"

Area (sf)	CN	Description
3,222	98	Paved parking & roofs

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Type III 24-hr Rainfall=3.00"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	22	0.0830	1.7		Sheet Flow, A TO B Smooth surfaces n= 0.011 P2= 3.00"

Subcatchment OS: Off Site Drainage

Runoff = 5.11 cfs @ 12.15 hrs, Volume= 0.450 af, Depth= 0.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=3.00"

Area (sf)	CN	Description
205,821	65	Brush, Good, HSG C
68,607	98	Paved parking & roofs
274,428	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	100	0.0700	0.3		Sheet Flow, Sheet Range n= 0.130 P2= 3.00"
3.4	375	0.0700	1.9		Shallow Concentrated Flow, Shallow Concentrated Short Grass Pasture Kv= 7.0 fps
0.8	470	0.0550	9.3	9.31	Channel Flow, Channel Area= 1.0 sf Perim= 3.0' r= 0.33' n= 0.018
9.7	945	Total			

Subcatchment V1: VLF SUBCATCHMENT 1

Runoff = 10.21 cfs @ 12.17 hrs, Volume= 0.905 af, Depth= 1.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=3.00"

Area (sf)	CN	Description
88,010	98	Paved parking & roofs
167,455	79	50-75% Grass cover, Fair, HSG C
26,880	84	50-75% Grass cover, Fair, HSG D
26,800	69	50-75% Grass cover, Fair, HSG B
59,158	56	Brush, Fair, HSG B
50,881	70	Brush, Fair, HSG C
419,184	78	Weighted Average

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	130	0.0400	0.2		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 3.00"
1.6	190	0.0800	2.0		Shallow Concentrated Flow, B-C
					Short Grass Pasture Kv= 7.0 fps
0.6	380	0.0840	11.5	11.50	Channel Flow, B-C
					Area= 1.0 sf Perim= 3.0' r= 0.33' n= 0.018
11.7	700	Total			

Reach 1R: Avesta Reach 1

Inflow Area = 0.443 ac, Inflow Depth = 1.98"
 Inflow = 1.09 cfs @ 12.06 hrs, Volume= 0.073 af
 Outflow = 1.09 cfs @ 12.07 hrs, Volume= 0.073 af, Atten= 1%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 3.3 fps, Min. Travel Time= 0.4 min
 Avg. Velocity = 1.1 fps, Avg. Travel Time= 1.3 min

Peak Depth= 0.44'
 Capacity at bank full= 2.73 cfs
 Inlet Invert= 117.80', Outlet Invert= 117.36'
 12.0" Diameter Pipe n= 0.012 Length= 88.0' Slope= 0.0050 1'

Reach 2R: Avesta Reach 2

Inflow Area = 0.616 ac, Inflow Depth = 1.98"
 Inflow = 1.42 cfs @ 12.06 hrs, Volume= 0.102 af
 Outflow = 1.42 cfs @ 12.07 hrs, Volume= 0.102 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 4.6 fps, Min. Travel Time= 0.2 min
 Avg. Velocity = 1.6 fps, Avg. Travel Time= 0.5 min

Peak Depth= 0.42'
 Capacity at bank full= 3.90 cfs
 Inlet Invert= 117.10', Outlet Invert= 116.64'
 12.0" Diameter Pipe n= 0.012 Length= 45.0' Slope= 0.0102 1'

Reach 3R: Avesta Reach 3

Inflow Area = 0.690 ac, Inflow Depth = 2.07"
 Inflow = 1.59 cfs @ 12.06 hrs, Volume= 0.119 af
 Outflow = 1.58 cfs @ 12.06 hrs, Volume= 0.119 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 6.9 fps, Min. Travel Time= 0.2 min
 Avg. Velocity = 2.1 fps, Avg. Travel Time= 0.7 min

Peak Depth= 0.33'
 Capacity at bank full= 6.62 cfs
 Inlet Invert= 116.20', Outlet Invert= 113.67'
 12.0" Diameter Pipe n= 0.012 Length= 86.0' Slope= 0.0294 1'

Reach EX: EXISTING CULVERT

Inflow Area = 6.300 ac, Inflow Depth = 0.86"
 Inflow = 5.11 cfs @ 12.15 hrs, Volume= 0.450 af
 Outflow = 5.10 cfs @ 12.15 hrs, Volume= 0.450 af, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 3.6 fps, Min. Travel Time= 0.2 min
 Avg. Velocity = 1.6 fps, Avg. Travel Time= 0.5 min

Peak Depth= 1.11'
 Capacity at bank full= 5.69 cfs
 18.0" Diameter Pipe n= 0.024 Length= 45.0' Slope= 0.0100 1'

Pond IR: Avesta Isolator Row

Inflow Area = 0.690 ac, Inflow Depth = 2.07"
 Inflow = 1.58 cfs @ 12.06 hrs, Volume= 0.119 af
 Outflow = 1.59 cfs @ 12.07 hrs, Volume= 0.095 af, Atten= 0%, Lag= 0.1 min
 Primary = 1.59 cfs @ 12.07 hrs, Volume= 0.095 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 113.77' Storage= 1,053 cf
 Plug-Flow detention time= 120.3 min calculated for 0.095 af (80% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
110.00	0	0
111.00	350	350
112.00	350	700
113.00	300	1,000
113.50	50	1,050
114.00	6	1,056
115.00	6	1,062
116.00	6	1,068
118.00	6	1,074

Primary OutFlow Max=1.58 cfs @ 12.07 hrs HW=113.77' (Free Discharge)
 1=Broad-Crested Rectangular Weir (Controls 1.58 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	113.50'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

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Pond UG: Avesta Underground Storage

Inflow Area = 0.690 ac, Inflow Depth = 1.65"
 Inflow = 1.59 cfs @ 12.07 hrs, Volume= 0.095 af
 Outflow = 0.09 cfs @ 14.32 hrs, Volume= 0.074 af, Atten= 95%, Lag= 135.1 min
 Primary = 0.09 cfs @ 14.32 hrs, Volume= 0.074 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 111.27' Storage= 2,279 cf

Plug-Flow detention time= 344.3 min calculated for 0.074 af (78% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
110.00	0	0
111.00	1,798	1,798
112.00	1,798	3,596
113.00	1,698	5,294
113.50	100	5,394

Primary OutFlow Max=0.09 cfs @ 14.32 hrs HW=111.27' (Free Discharge)

1=Orifice/Grate (Controls 0.09 cfs)

2=Orifice/Grate (Controls 0.00 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	110.50'	2.0" Vert. Orifice/Grate C= 0.600
2	Primary	112.00'	4.0" Vert. Orifice/Grate C= 0.600

Link SP1: Analysis Point 4

Inflow Area = 16.613 ac, Inflow Depth = 1.03"
 Inflow = 15.32 cfs @ 12.16 hrs, Volume= 1.429 af
 Primary = 15.32 cfs @ 12.16 hrs, Volume= 1.429 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS, Type III 24-hr Rainfall=4.70"

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A1: AVESTA SUBCATCHMENT A1

Runoff Area=19,288 sf Runoff Depth=3.59"

Length=70' Tc=4.1 min CN=90 Runoff= 1.93 cfs 0.132 af

Subcatchment A2: AVESTA SUBCATCHMENT A2

Runoff Area=7,545 sf Runoff Depth=3.59"

Length=40' Tc=0.6 min CN=90 Runoff= 0.85 cfs 0.052 af

Subcatchment A3: AVESTA SUBCATCHMENT A3

Runoff Area=3,222 sf Runoff Depth=4.46"

Length=22' Tc=0.2 min CN=98 Runoff= 0.41 cfs 0.028 af

Subcatchment OS: Off Site Drainage

Runoff Area=274,428 sf Runoff Depth=2.05"

Length=945' Tc=9.7 min CN=73 Runoff= 13.16 cfs 1.075 af

Subcatchment V1: VLF SUBCATCHMENT 1

Runoff Area=419,184 sf Runoff Depth=2.46"

Length=700' Tc=11.7 min CN=78 Runoff= 22.98 cfs 1.972 af

Reach 1R: Avesta Reach 1

Peak Depth= 0.62' Max Vel= 3.8 fps Inflow= 1.93 cfs 0.132 af

D=12.0" n=0.012 L=88.0' S=0.0050 '/ Capacity=2.73 cfs Outflow= 1.92 cfs 0.132 af

Reach 2R: Avesta Reach 2

Peak Depth= 0.58' Max Vel= 5.3 fps Inflow= 2.51 cfs 0.184 af

D=12.0" n=0.012 L=45.0' S=0.0102 '/ Capacity=3.90 cfs Outflow= 2.51 cfs 0.184 af

Reach 3R: Avesta Reach 3

Peak Depth= 0.45' Max Vel= 8.1 fps Inflow= 2.78 cfs 0.212 af

D=12.0" n=0.012 L=86.0' S=0.0294 '/ Capacity=6.62 cfs Outflow= 2.78 cfs 0.212 af

Reach EX: EXISTING CULVERT

Peak Depth= 1.50' Max Vel= 3.7 fps Inflow= 13.16 cfs 1.075 af

D=18.0" n=0.024 L=45.0' S=0.0100 '/ Capacity=5.69 cfs Outflow= 5.98 cfs 1.075 af

Pond 1R: Avesta Isolator Row

Peak Storage= 1,055 cf @ 113.88' Inflow= 2.78 cfs 0.212 af

Primary= 2.78 cfs 0.188 af Outflow= 2.78 cfs 0.188 af

Pond UG: Avesta Underground Storage

Peak Storage= 4,338 cf @ 112.44' Inflow= 2.78 cfs 0.188 af

Primary= 0.36 cfs 0.167 af Outflow= 0.36 cfs 0.167 af

Link SP1: Analysis Point 4

Inflow= 28.78 cfs 3.214 af

Primary= 28.78 cfs 3.214 af

Total Runoff Area = 16.613 ac Runoff Volume = 3.259 af Average Runoff Depth = 2.35"

Subcatchment A1: AVESTA SUBCATCHMENT A1

Runoff = 1.93 cfs @ 12.06 hrs, Volume= 0.132 af, Depth= 3.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Type III 24-hr Rainfall=4.70"

Area (sf)	CN	Description
12,589	98	Paved parking & roofs
6,699	74	>75% Grass cover, Good, HSG C
19,288	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	20	0.0300	0.1		Sheet Flow, A TO B Grass: Dense n= 0.240 P2= 3.00"
0.6	50	0.0050	1.4		Shallow Concentrated Flow, B TO C Paved Kv= 20.3 fps
4.1	70	Total			

Subcatchment A2: AVESTA SUBCATCHMENT A2

Runoff = 0.85 cfs @ 12.01 hrs, Volume= 0.052 af, Depth= 3.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Type III 24-hr Rainfall=4.70"

Area (sf)	CN	Description
2,637	74	>75% Grass cover, Good, HSG C
4,908	98	Paved parking & roofs
7,545	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	40	0.0175	1.1		Sheet Flow, A TO B Smooth surfaces n= 0.011 P2= 3.00"

Subcatchment A3: AVESTA SUBCATCHMENT A3

Runoff = 0.41 cfs @ 12.00 hrs, Volume= 0.028 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Type III 24-hr Rainfall=4.70"

Area (sf)	CN	Description
3,222	98	Paved parking & roofs

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Type III 24-hr Rainfall=4.70"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	22	0.0830	1.7		Sheet Flow, A TO B Smooth surfaces n= 0.011 P2= 3.00"

Subcatchment OS: Off Site Drainage

Runoff = 13.16 cfs @ 12.14 hrs, Volume= 1.075 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=4.70"

Area (sf)	CN	Description
205,821	65	Brush, Good, HSG C
68,607	98	Paved parking & roofs
274,428	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	100	0.0700	0.3		Sheet Flow, Sheet Range n= 0.130 P2= 3.00"
3.4	375	0.0700	1.9		Shallow Concentrated Flow, Shallow Concentrated Short Grass Pasture, Kv= 7.0 fps
0.8	470	0.0550	9.3	9.31	Channel Flow, Channel Area= 1.0 sf Perim= 3.0' r= 0.33' n= 0.018
9.7	945	Total			

Subcatchment V1: VLF SUBCATCHMENT 1

Runoff = 22.98 cfs @ 12.16 hrs, Volume= 1.972 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=4.70"

Area (sf)	CN	Description
88,010	98	Paved parking & roofs
167,455	79	50-75% Grass cover, Fair, HSG C
26,880	84	50-75% Grass cover, Fair, HSG D
26,800	69	50-75% Grass cover, Fair, HSG B
59,158	56	Brush, Fair, HSG B
50,881	70	Brush, Fair, HSG C
419,184	78	Weighted Average

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	130	0.0400	0.2		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.00"
1.6	190	0.0800	2.0		Shallow Concentrated Flow, B-C Short Grass Pasture Kv= 7.0 fps
0.6	380	0.0840	11.5	11.50	Channel Flow, B-C Area= 1.0 sf Perim= 3.0' r= 0.33' n= 0.018
11.7	700	Total			

Reach 1R: Avesta Reach 1

Inflow Area = 0.443 ac, Inflow Depth = 3.59"
 Inflow = 1.93 cfs @ 12.06 hrs, Volume= 0.132 af
 Outflow = 1.92 cfs @ 12.07 hrs, Volume= 0.132 af, Atten= 1%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 3.8 fps, Min. Travel Time= 0.4 min
 Avg. Velocity= 1.3 fps, Avg. Travel Time= 1.2 min

Peak Depth= 0.62'
 Capacity at bank full= 2.73 cfs
 Inlet Invert= 117.80', Outlet Invert= 117.36'
 12.0" Diameter Pipe n= 0.012 Length= 88.0' Slope= 0.0050 '/'

Reach 2R: Avesta Reach 2

Inflow Area = 0.616 ac, Inflow Depth = 3.59"
 Inflow = 2.51 cfs @ 12.06 hrs, Volume= 0.184 af
 Outflow = 2.51 cfs @ 12.06 hrs, Volume= 0.184 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 5.3 fps, Min. Travel Time= 0.1 min
 Avg. Velocity= 1.8 fps, Avg. Travel Time= 0.4 min

Peak Depth= 0.58'
 Capacity at bank full= 3.90 cfs
 Inlet Invert= 117.10', Outlet Invert= 116.64'
 12.0" Diameter Pipe n= 0.012 Length= 45.0' Slope= 0.0102 '/'

Reach 3R: Avesta Reach 3

Inflow Area = 0.690 ac, Inflow Depth = 3.68"
 Inflow = 2.78 cfs @ 12.06 hrs, Volume= 0.212 af
 Outflow = 2.78 cfs @ 12.06 hrs, Volume= 0.212 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 8.1 fps, Min. Travel Time= 0.2 min
 Avg. Velocity= 2.5 fps, Avg. Travel Time= 0.6 min

Peak Depth= 0.45'

Capacity at bank full= 6.62 cfs

Inlet Invert= 116.20', Outlet Invert= 113.67'

12.0" Diameter Pipe n= 0.012 Length= 86.0' Slope= 0.0294 1'

Reach EX: EXISTING CULVERT

Inflow Area = 6.300 ac, Inflow Depth = 2.05"

Inflow = 13.16 cfs @ 12.14 hrs, Volume= 1.075 af

Outflow = 5.98 cfs @ 12.01 hrs, Volume= 1.075 af, Atten= 55%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 3.7 fps, Min. Travel Time= 0.2 min

Avg. Velocity= 1.9 fps, Avg. Travel Time= 0.4 min

Peak Depth= 1.50'

Capacity at bank full= 5.69 cfs

18.0" Diameter Pipe n= 0.024 Length= 45.0' Slope= 0.0100 1'

Pond IR: Avesta Isolator Row

Inflow Area = 0.690 ac, Inflow Depth = 3.68"

Inflow = 2.78 cfs @ 12.06 hrs, Volume= 0.212 af

Outflow = 2.78 cfs @ 12.06 hrs, Volume= 0.188 af, Atten= 0%, Lag= 0.0 min

Primary = 2.78 cfs @ 12.06 hrs, Volume= 0.188 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 113.88' Storage= 1,055 cf

Plug-Flow detention time= 85.7 min calculated for 0.188 af (89% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
110.00	0	0
111.00	350	350
112.00	350	700
113.00	300	1,000
113.50	50	1,050
114.00	6	1,056
115.00	6	1,062
116.00	6	1,068
118.00	6	1,074

Primary OutFlow Max=2.76 cfs @ 12.06 hrs HW=113.88' (Free Discharge)

1=Broad-Crested Rectangular Weir (Controls 2.76 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	113.50'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir
			Head (feet) 0.20 0.40 0.60 0.80 1.00
			Coef. (English) 2.80 2.92 3.08 3.30 3.32

Pond UG: Avesta Underground Storage

Inflow Area = 0.690 ac, Inflow Depth = 3.26"
 Inflow = 2.78 cfs @ 12.06 hrs, Volume= 0.188 af
 Outflow = 0.36 cfs @ 12.61 hrs, Volume= 0.167 af, Atten= 87%, Lag= 33.0 min
 Primary = 0.36 cfs @ 12.61 hrs, Volume= 0.167 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 112.44' Storage= 4,338 cf

Plug-Flow detention time= 323.1 min calculated for 0.167 af (89% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
110.00	0	0
111.00	1,798	1,798
112.00	1,798	3,596
113.00	1,698	5,294
113.50	100	5,394

Primary OutFlow Max=0.36 cfs @ 12.61 hrs HW=112.44' (Free Discharge)

1=Orifice/Grate (Controls 0.14 cfs)

2=Orifice/Grate (Controls 0.22 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	110.50'	2.0" Vert. Orifice/Grate C= 0.600
2	Primary	112.00'	4.0" Vert. Orifice/Grate C= 0.600

Link SP1: Analysis Point 4

Inflow Area = 16.613 ac, Inflow Depth = 2.32"
 Inflow = 28.78 cfs @ 12.16 hrs, Volume= 3.214 af
 Primary = 28.78 cfs @ 12.16 hrs, Volume= 3.214 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS, Type III 24-hr Rainfall=5.50"

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A1: AVESTA SUBCATCHMENT A1 Runoff Area=19,288 sf Runoff Depth=4.36"
Length=70' Tc=4.1 min CN=90 Runoff= 2.32 cfs 0.161 af

Subcatchment A2: AVESTA SUBCATCHMENT A2 Runoff Area=7,545 sf Runoff Depth=4.36"
Length=40' Tc=0.6 min CN=90 Runoff= 1.03 cfs 0.063 af

Subcatchment A3: AVESTA SUBCATCHMENT A3 Runoff Area=3,222 sf Runoff Depth=5.26"
Length=22' Tc=0.2 min CN=98 Runoff= 0.48 cfs 0.032 af

Subcatchment OS: Off Site Drainage Runoff Area=274,428 sf Runoff Depth=2.68"
Length=945' Tc=9.7 min CN=73 Runoff= 17.37 cfs 1.406 af

Subcatchment V1: VLF SUBCATCHMENT 1 Runoff Area=419,184 sf Runoff Depth=3.14"
Length=700' Tc=11.7 min CN=78 Runoff= 29.39 cfs 2.519 af

Reach 1R: Avesta Reach 1 Peak Depth= 0.71' Max Vel= 3.9 fps Inflow= 2.32 cfs 0.161 af
D=12.0" n=0.012 L=88.0' S=0.0050 '/' Capacity=2.73 cfs Outflow= 2.31 cfs 0.161 af

Reach 2R: Avesta Reach 2 Peak Depth= 0.66' Max Vel= 5.5 fps Inflow= 3.02 cfs 0.224 af
D=12.0" n=0.012 L=45.0' S=0.0102 '/' Capacity=3.90 cfs Outflow= 3.02 cfs 0.224 af

Reach 3R: Avesta Reach 3 Peak Depth= 0.50' Max Vel= 8.4 fps Inflow= 3.34 cfs 0.256 af
D=12.0" n=0.012 L=86.0' S=0.0294 '/' Capacity=6.62 cfs Outflow= 3.34 cfs 0.256 af

Reach EX: EXISTING CULVERT Peak Depth= 1.50' Max Vel= 3.7 fps Inflow= 17.37 cfs 1.406 af
D=18.0" n=0.024 L=45.0' S=0.0100 '/' Capacity=5.69 cfs Outflow= 6.04 cfs 1.406 af

Pond 1R: Avesta Isolator Row Peak Storage= 1,055 cf @ 113.93' Inflow= 3.34 cfs 0.256 af
Primary= 3.34 cfs 0.232 af Outflow= 3.34 cfs 0.232 af

Pond UG: Avesta Underground Storage Peak Storage= 5,227 cf @ 112.96' Inflow= 3.34 cfs 0.232 af
Primary= 0.54 cfs 0.211 af Outflow= 0.54 cfs 0.211 af

Link SP1: Analysis Point 4 Inflow= 35.45 cfs 4.136 af
Primary= 35.45 cfs 4.136 af

Total Runoff Area = 16.613 ac Runoff Volume = 4.182 af Average Runoff Depth = 3.02"

Subcatchment A1: AVESTA SUBCATCHMENT A1

Runoff = 2.32 cfs @ 12.06 hrs, Volume= 0.161 af, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
12,589	98	Paved parking & roofs
6,699	74	>75% Grass cover, Good, HSG C
19,288	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	20	0.0300	0.1		Sheet Flow, A TO B Grass: Dense n= 0.240 P2= 3.00"
0.6	50	0.0050	1.4		Shallow Concentrated Flow, B TO C Paved Kv= 20.3 fps
4.1	70	Total			

Subcatchment A2: AVESTA SUBCATCHMENT A2

Runoff = 1.03 cfs @ 12.01 hrs, Volume= 0.063 af, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
2,637	74	>75% Grass cover, Good, HSG C
4,908	98	Paved parking & roofs
7,545	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	40	0.0175	1.1		Sheet Flow, A TO B Smooth surfaces n= 0.011 P2= 3.00"

Subcatchment A3: AVESTA SUBCATCHMENT A3

Runoff = 0.48 cfs @ 12.00 hrs, Volume= 0.032 af, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
3,222	98	Paved parking & roofs

To (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	22	0.0830	1.7		Sheet Flow, A TO B Smooth surfaces n= 0.011 P2= 3.00"

Subcatchment OS: Off Site Drainage

Runoff = 17.37 cfs @ 12.14 hrs, Volume= 1.406 af, Depth= 2.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
205,821	65	Brush, Good, HSG C
68,607	98	Paved parking & roofs
274,428	73	Weighted Average

To (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	100	0.0700	0.3		Sheet Flow, Sheet Range n= 0.130 P2= 3.00"
3.4	375	0.0700	1.9		Shallow Concentrated Flow, Shallow Concentrated Short Grass Pasture Kv= 7.0 fps
0.8	470	0.0550	9.3	9.31	Channel Flow, Channel Area= 1.0 sf Perim= 3.0' r= 0.33' n= 0.018
9.7	945	Total			

Subcatchment V1: VLF SUBCATCHMENT 1

Runoff = 29.39 cfs @ 12.16 hrs, Volume= 2.519 af, Depth= 3.14"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
88,010	98	Paved parking & roofs
167,455	79	50-75% Grass cover, Fair, HSG C
26,880	84	50-75% Grass cover, Fair, HSG D
26,800	69	50-75% Grass cover, Fair, HSG B
59,158	56	Brush, Fair, HSG B
50,881	70	Brush, Fair, HSG C
419,184	78	Weighted Average

To (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	130	0.0400	0.2		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.00"
1.6	190	0.0800	2.0		Shallow Concentrated Flow, B-C Short Grass Pasture Kv= 7.0 fps
0.6	380	0.0840	11.5	11.50	Channel Flow, B-C Area= 1.0 sf Perim= 3.0' r= 0.33' n= 0.018
11.7	700	Total			

Reach 1R: Avesta Reach 1

Inflow Area = 0.443 ac, Inflow Depth = 4.36"
 Inflow = 2.32 cfs @ 12.06 hrs, Volume= 0.161 af
 Outflow = 2.31 cfs @ 12.07 hrs, Volume= 0.161 af, Atten= 1%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 3.9 fps, Min. Travel Time= 0.4 min
 Avg. Velocity = 1.3 fps, Avg. Travel Time= 1.1 min

Peak Depth= 0.71'
 Capacity at bank full= 2.73 cfs
 Inlet Invert= 117.80', Outlet Invert= 117.36'
 12.0" Diameter Pipe n= 0.012 Length= 88.0' Slope= 0.0050 '/'

Reach 2R: Avesta Reach 2

Inflow Area = 0.616 ac, Inflow Depth = 4.36"
 Inflow = 3.02 cfs @ 12.06 hrs, Volume= 0.224 af
 Outflow = 3.02 cfs @ 12.06 hrs, Volume= 0.224 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 5.5 fps, Min. Travel Time= 0.1 min
 Avg. Velocity = 1.9 fps, Avg. Travel Time= 0.4 min

Peak Depth= 0.66'
 Capacity at bank full= 3.90 cfs
 Inlet Invert= 117.10', Outlet Invert= 116.64'
 12.0" Diameter Pipe n= 0.012 Length= 45.0' Slope= 0.0102 '/'

Reach 3R: Avesta Reach 3

Inflow Area = 0.690 ac, Inflow Depth = 4.46"
 Inflow = 3.34 cfs @ 12.06 hrs, Volume= 0.256 af
 Outflow = 3.34 cfs @ 12.06 hrs, Volume= 0.256 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 8.4 fps, Min. Travel Time= 0.2 min
 Avg. Velocity = 2.6 fps, Avg. Travel Time= 0.5 min

Peak Depth= 0.50'

Capacity at bank full= 6.62 cfs

Inlet Invert= 116.20', Outlet Invert= 113.67'

12.0" Diameter Pipe n= 0.012 Length= 86.0' Slope= 0.0294 1'

Reach EX: EXISTING CULVERT

Inflow Area = 6.300 ac, Inflow Depth = 2.68"

Inflow = 17.37 cfs @ 12.14 hrs, Volume= 1.406 af

Outflow = 6.04 cfs @ 11.95 hrs, Volume= 1.406 af, Atten= 65%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 3.7 fps, Min. Travel Time= 0.2 min

Avg. Velocity= 2.0 fps, Avg. Travel Time= 0.4 min

Peak Depth= 1.50'

Capacity at bank full= 5.69 cfs

18.0" Diameter Pipe n= 0.024 Length= 45.0' Slope= 0.0100 1'

Pond IR: Avesta Isolator Row

Inflow Area = 0.690 ac, Inflow Depth = 4.46"

Inflow = 3.34 cfs @ 12.06 hrs, Volume= 0.256 af

Outflow = 3.34 cfs @ 12.06 hrs, Volume= 0.232 af, Atten= 0%, Lag= 0.0 min

Primary = 3.34 cfs @ 12.06 hrs, Volume= 0.232 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 113.93' Storage= 1,055 cf

Plug-Flow detention time= 76.1 min calculated for 0.232 af (91% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
110.00	0	0
111.00	350	350
112.00	350	700
113.00	300	1,000
113.50	50	1,050
114.00	6	1,056
115.00	6	1,062
116.00	6	1,068
118.00	6	1,074

Primary OutFlow Max=3.33 cfs @ 12.06 hrs HW=113.93' (Free Discharge)

1=Broad-Crested Rectangular Weir (Controls 3.33 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	113.50'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir
			Head (feet) 0.20 0.40 0.60 0.80 1.00
			Coef. (English) 2.80 2.92 3.08 3.30 3.32

Pond UG: Avesta Underground Storage

Inflow Area = 0.690 ac, Inflow Depth = 4.04"
 Inflow = 3.34 cfs @ 12.06 hrs, Volume= 0.232 af
 Outflow = 0.54 cfs @ 12.54 hrs, Volume= 0.211 af, Atten= 84%, Lag= 28.6 min
 Primary = 0.54 cfs @ 12.54 hrs, Volume= 0.211 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 112.96' Storage= 5,227 cf

Plug-Flow detention time= 285.4 min calculated for 0.211 af (91% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
110.00	0	0
111.00	1,798	1,798
112.00	1,798	3,596
113.00	1,698	5,294
113.50	100	5,394

Primary OutFlow Max=0.54 cfs @ 12.54 hrs HW=112.96' (Free Discharge)

1=Orifice/Grate (Controls 0.16 cfs)

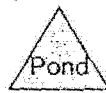
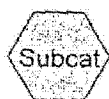
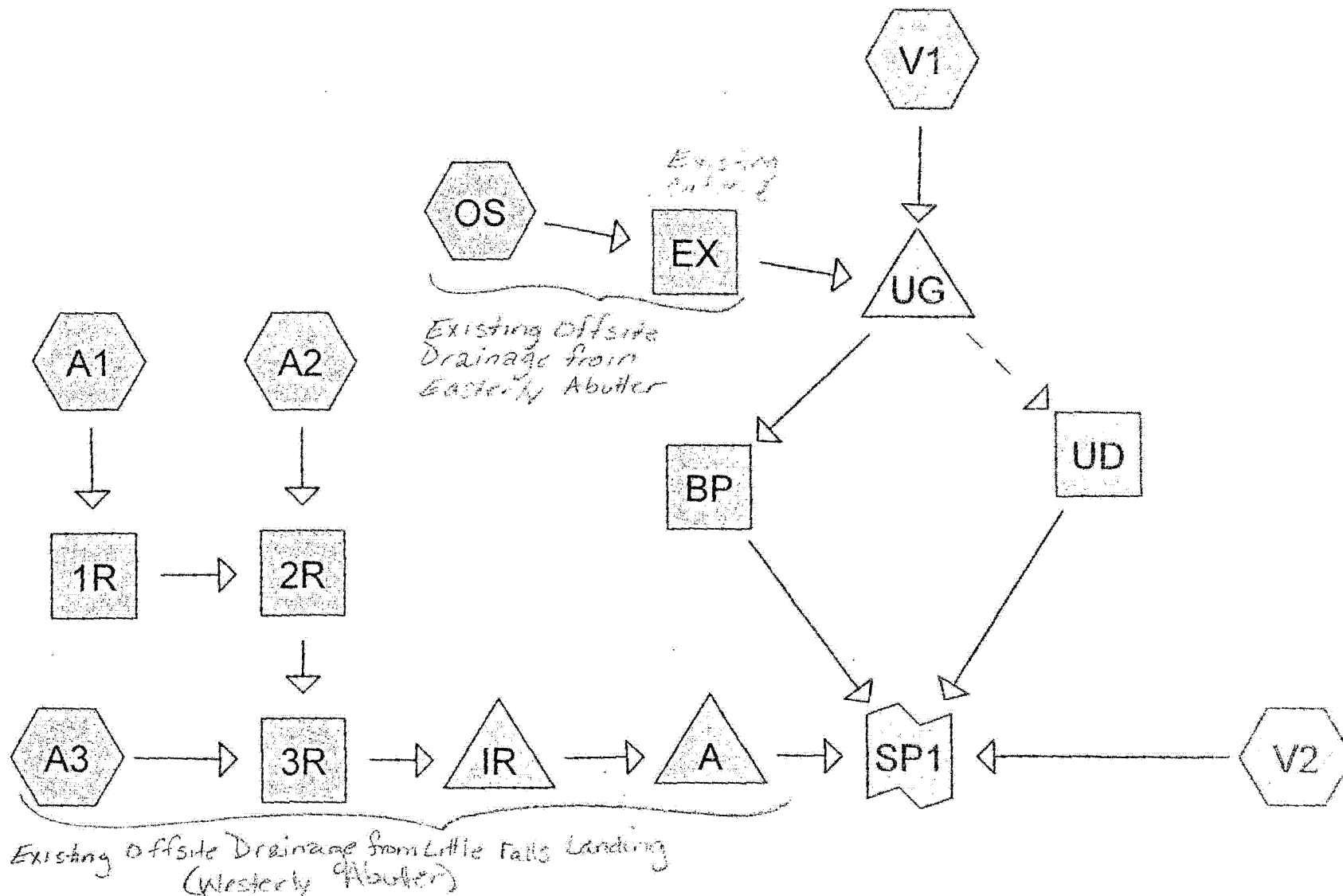
2=Orifice/Grate (Controls 0.37 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	110.50'	2.0" Vert. Orifice/Grate C= 0.600
2	Primary	112.00'	4.0" Vert. Orifice/Grate C= 0.600

Link SP1: Analysis Point 4

Inflow Area = 16.613 ac, Inflow Depth = 2.99"
 Inflow = 35.45 cfs @ 12.16 hrs, Volume= 4.136 af
 Primary = 35.45 cfs @ 12.16 hrs, Volume= 4.136 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs



Drainage Diagram for POST DRAINAGE 05-29-07

Prepared by Northeast Civil Solutions, Inc. 5/30/2007

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VIL_RESP03094

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS, Type III 24-hr Rainfall=3.00"

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A1: AVESTA SUBCATCHMENT A1 Runoff Area=19,288 sf Runoff Depth=1.98"
Length=70' Tc=4.1 min CN=90 Runoff= 1.09 cfs 0.073 af

Subcatchment A2: AVESTA SUBCATCHMENT A2 Runoff Area=7,545 sf Runoff Depth=1.98"
Length=40' Tc=0.6 min CN=90 Runoff= 0.48 cfs 0.029 af

Subcatchment A3: AVESTA SUBCATCHMENT A3 Runoff Area=3,222 sf Runoff Depth=2.77"
Length=22' Tc=0.2 min CN=98 Runoff= 0.26 cfs 0.017 af

Subcatchment OS: Off-site Drainage Area Runoff Area=274,428 sf Runoff Depth=0.86"
Length=967' Tc=9.7 min CN=73 Runoff= 5.11 cfs 0.450 af

Subcatchment V1: VLF SUBCATCHMENT 1 Runoff Area=302,380 sf Runoff Depth=1.90"
Length=865' Tc=8.2 min CN=89 Runoff= 14.28 cfs 1.099 af

Subcatchment V2: VLF - POST 2 Runoff Area=116,804 sf Runoff Depth=1.02"
Length=208' Tc=4.0 min CN=76 Runoff= 3.28 cfs 0.227 af

Reach 1R: Avesta Reach 1 Peak Depth= 0.44' Max Vel= 3.3 fps Inflow= 1.09 cfs 0.073 af
D=12.0" n=0.012 L=88.0' S=0.0050 '/' Capacity=2.73 cfs Outflow= 1.09 cfs 0.073 af

Reach 2R: Avesta Reach 2 Peak Depth= 0.42' Max Vel= 4.6 fps Inflow= 1.42 cfs 0.102 af
D=12.0" n=0.012 L=45.0' S=0.0102 '/' Capacity=3.90 cfs Outflow= 1.42 cfs 0.102 af

Reach 3R: Avesta Reach 3 Peak Depth= 0.33' Max Vel= 6.9 fps Inflow= 1.59 cfs 0.119 af
D=12.0" n=0.012 L=86.0' S=0.0294 '/' Capacity=6.62 cfs Outflow= 1.58 cfs 0.119 af

Reach BP: Bypass Peak Depth= 0.89' Max Vel= 7.1 fps Inflow= 11.20 cfs 0.556 af
D=30.0" n=0.012 L=70.0' S=0.0086 '/' Capacity=41.14 cfs Outflow= 11.19 cfs 0.556 af

Reach EX: Existing Culvert Peak Depth= 1.11' Max Vel= 3.6 fps Inflow= 5.11 cfs 0.450 af
D=18.0" n=0.024 L=45.0' S=0.0100 '/' Capacity=5.69 cfs Outflow= 5.10 cfs 0.450 af

Reach UD: Underdrain Peak Depth= 0.50' Max Vel= 3.5 fps Inflow= 0.66 cfs 0.993 af
D=6.0" n=0.012 L=160.0' S=0.0100 '/' Capacity=0.61 cfs Outflow= 0.65 cfs 0.993 af

Pond A: Avesta Underground Storage Peak Storage= 2,279 cf @ 111.27' Inflow= 1.59 cfs 0.095 af
Primary= 0.09 cfs 0.074 af Outflow= 0.09 cfs 0.074 af

Pond IR: Avesta Isolator Row Peak Storage= 1,053 cf @ 113.77' Inflow= 1.58 cfs 0.119 af
Primary= 1.59 cfs 0.095 af Outflow= 1.59 cfs 0.095 af

Pond UG: UNDERGROUND DETENTION V1 Peak Storage= 17,955 cf @ 106.04' Inflow= 19.07 cfs 1.549 af
Primary= 11.20 cfs 0.556 af Secondary= 0.66 cfs 0.993 af Outflow= 11.86 cfs 1.549 af

700ST DRAINAGE 05-29-07

Type III 24-hr Rainfall=3.00"

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Link SP1: Analysis Point 4

Inflow= 13.34 cfs 1.850 af

Primary= 13.34 cfs 1.850 af

Total Runoff Area = 16.613 ac Runoff Volume = 1.895 af Average Runoff Depth = 1.37"

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Subcatchment A1: AVESTA SUBCATCHMENT A1

Runoff = 1.09 cfs @ 12.06 hrs, Volume= 0.073 af, Depth= 1.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=3.00"

Area (sf)	CN	Description
12,589	98	Paved parking & roofs
6,699	74	>75% Grass cover, Good, HSG C
19,288	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	20	0.0300	0.1		Sheet Flow, A TO B
					Grass: Dense, n= 0.240 P2= 3.00"
0.6	50	0.0050	1.4		Shallow Concentrated Flow, B TO C
					Paved Kv= 20.3 fps
4.1	70	Total			

Subcatchment A2: AVESTA SUBCATCHMENT A2

Runoff = 0.48 cfs @ 12.01 hrs, Volume= 0.029 af, Depth= 1.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=3.00"

Area (sf)	CN	Description
2,637	74	>75% Grass cover, Good, HSG C
4,908	98	Paved parking & roofs
7,545	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	40	0.0175	1.1		Sheet Flow, A TO B
					Smooth surfaces n= 0.011 P2= 3.00"

Subcatchment A3: AVESTA SUBCATCHMENT A3

Runoff = 0.26 cfs @ 12.00 hrs, Volume= 0.017 af, Depth= 2.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=3.00"

Area (sf)	CN	Description
3,222	98	Paved parking & roofs

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	22	0.0830	1.7		Sheet Flow, A TO B Smooth surfaces n= 0.011 P2= 3.00"

Subcatchment OS: Off-site Drainage Area

Runoff = 5.11 cfs @ 12.15 hrs, Volume= 0.450 af, Depth= 0.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr Rainfall=3.00"

Area (sf)	CN	Description
205,821	65	Brush, Good, HSG C
68,607	98	Paved parking & roofs
274,428	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	100	0.0700	0.3		Sheet Flow, SHEET Range n= 0.130 P2= 3.00"
3.4	375	0.0700	1.9		Shallow Concentrated Flow, Shallow Conc. Flow Short Grass Pasture Kv= 7.0 fps
0.8	492	0.0250	10.3	18.59	Channel Flow, Pipe Flow Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
9.7	967	Total			

Subcatchment V1: VLF SUBCATCHMENT 1

Runoff = 14.28 cfs @ 12.11 hrs, Volume= 1.099 af, Depth= 1.90"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr Rainfall=3.00"

Area (sf)	CN	Description
205,685	98	Paved parking & roofs
62,411	74	>75% Grass cover, Good, HSG C
5,620	80	>75% Grass cover, Good, HSG D
28,664	61	>75% Grass cover, Good, HSG B
302,380	89	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	40	0.0500	0.2		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.00"
3.7	315	0.0050	1.4		Shallow Concentrated Flow, B-C Paved Kv= 20.3 fps
1.1	510	0.0150	8.0	14.40	Channel Flow, C-D Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
8.2	865	Total			

Subcatchment V2: VLF - POST 2

Runoff = 3.28 cfs @ 12.07 hrs, Volume= 0.227 af, Depth= 1.02"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=3.00"

Area (sf)	CN	Description
17,819	98	Paved parking & roofs
87,691	74	>75% Grass cover, Good, HSG C
11,294	61	>75% Grass cover, Good, HSG B
116,804	76	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	45	0.0900	0.3		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 3.00"
1.1	163	0.1160	2.4		Shallow Concentrated Flow, B-C
					Short Grass Pasture Kv= 7.0 fps
4.0	208	Total			

Reach 1R: Avesta Reach 1

Inflow Area = 0.443 ac, Inflow Depth = 1.98"
 Inflow = 1.09 cfs @ 12.06 hrs, Volume= 0.073 af
 Outflow = 1.09 cfs @ 12.07 hrs, Volume= 0.073 af, Atten= 1%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 3.3 fps, Min. Travel Time= 0.4 min
 Avg. Velocity= 1.1 fps, Avg. Travel Time= 1.3 min

Peak Depth= 0.44'
 Capacity at bank full= 2.73 cfs
 Inlet Invert= 117.80', Outlet Invert= 117.36'
 12.0" Diameter Pipe n= 0.012 Length= 88.0' Slope= 0.0050 '/'

Reach 2R: Avesta Reach 2

Inflow Area = 0.616 ac, Inflow Depth = 1.98"
 Inflow = 1.42 cfs @ 12.06 hrs, Volume= 0.102 af
 Outflow = 1.42 cfs @ 12.07 hrs, Volume= 0.102 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 4.6 fps, Min. Travel Time= 0.2 min
 Avg. Velocity= 1.6 fps, Avg. Travel Time= 0.5 min

Peak Depth= 0.42'

Capacity at bank full= 3.90 cfs

Inlet Invert= 117.10', Outlet Invert= 116.64'

12.0" Diameter Pipe n= 0.012 Length= 45.0' Slope= 0.0102 '/'

Reach 3R: Avesta Reach 3

Inflow Area = 0.690 ac, Inflow Depth = 2.07"

Inflow = 1.59 cfs @ 12.06 hrs, Volume= 0.119 af

Outflow = 1.58 cfs @ 12.06 hrs, Volume= 0.119 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 6.9 fps, Min. Travel Time= 0.2 min

Avg. Velocity= 2.1 fps, Avg. Travel Time= 0.7 min

Peak Depth= 0.33'

Capacity at bank full= 6.62 cfs

Inlet Invert= 116.20', Outlet Invert= 113.67'

12.0" Diameter Pipe n= 0.012 Length= 86.0' Slope= 0.0294 '/'

Reach BP: Bypass

Inflow Area = 13.242 ac, Inflow Depth = 0.50"

Inflow = 11.20 cfs @ 12.27 hrs, Volume= 0.556 af

Outflow = 11.19 cfs @ 12.27 hrs, Volume= 0.556 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 7.1 fps, Min. Travel Time= 0.2 min

Avg. Velocity= 3.1 fps, Avg. Travel Time= 0.4 min

Peak Depth= 0.89'

Capacity at bank full= 41.14 cfs

Inlet Invert= 102.80', Outlet Invert= 102.20'

30.0" Diameter Pipe n= 0.012 Length= 70.0' Slope= 0.0086 '/'

Reach EX: Existing Culvert

Inflow Area = 6.300 ac, Inflow Depth = 0.86"

Inflow = 5.11 cfs @ 12.15 hrs, Volume= 0.450 af

Outflow = 5.10 cfs @ 12.15 hrs, Volume= 0.450 af, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 3.6 fps, Min. Travel Time= 0.2 min

Avg. Velocity= 1.6 fps, Avg. Travel Time= 0.5 min

Peak Depth= 1.11'

Capacity at bank full= 5.69 cfs

18.0" Diameter Pipe n= 0.024 Length= 45.0' Slope= 0.0100 '/'

Reach UD: Underdrain

Inflow = 0.66 cfs @ 10.97 hrs, Volume= 0.993 af
 Outflow = 0.65 cfs @ 10.99 hrs, Volume= 0.993 af, Atten= 1%, Lag= 1.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 3.5 fps, Min. Travel Time= 0.8 min
 Avg. Velocity= 2.9 fps, Avg. Travel Time= 0.9 min

Peak Depth= 0.50'
 Capacity at bank full= 0.61 cfs
 Inlet Invert= 99.60', Outlet Invert= 98.00'
 6.0" Diameter Pipe n= 0.012 Length= 160.0' Slope= 0.0100 1'

Pond A: Avesta Underground Storage

Inflow Area = 0.690 ac, Inflow Depth = 1.65"
 Inflow = 1.59 cfs @ 12.07 hrs, Volume= 0.095 af
 Outflow = 0.09 cfs @ 14.32 hrs, Volume= 0.074 af, Atten= 95%, Lag= 135.1 min
 Primary = 0.09 cfs @ 14.32 hrs, Volume= 0.074 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 111.27' Storage= 2,279 cf
 Plug-Flow detention time= 344.3 min calculated for 0.074 af (78% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
110.00	0	0
111.00	1,798	1,798
112.00	1,798	3,596
113.00	1,698	5,294
113.50	100	5,394

Primary OutFlow Max=0.09 cfs @ 14.32 hrs HW=111.27' (Free Discharge)

1=Orifice/Grate (Controls 0.09 cfs)
 2=Orifice/Grate (Controls 0.00 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	110.50'	2.0" Vert. Orifice/Grate C= 0.600
2	Primary	112.00'	4.0" Vert. Orifice/Grate C= 0.600

Pond IR: Avesta Isolator Row

Inflow Area = 0.690 ac, Inflow Depth = 2.07"
 Inflow = 1.58 cfs @ 12.06 hrs, Volume= 0.119 af
 Outflow = 1.59 cfs @ 12.07 hrs, Volume= 0.095 af, Atten= 0%, Lag= 0.1 min
 Primary = 1.59 cfs @ 12.07 hrs, Volume= 0.095 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

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Peak Elev= 113.77' Storage= 1,053 cf

Plug-Flow detention time= 120.3 min calculated for 0.095 af (80% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
110.00	0	0
111.00	350	350
112.00	350	700
113.00	300	1,000
113.50	50	1,050
114.00	6	1,056
115.00	6	1,062
116.00	6	1,068
118.00	6	1,074

Primary OutFlow Max=1.58 cfs @ 12.07 hrs HW=113.77' (Free Discharge)

1=Broad-Crested Rectangular Weir (Controls 1.58 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	113.50'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Pond UG: UNDERGROUND DETENTION V1

Inflow Area = 13.242 ac, Inflow Depth = 1.40"
 Inflow = 19.07 cfs @ 12.13 hrs, Volume= 1.549 af
 Outflow = 11.86 cfs @ 12.27 hrs, Volume= 1.549 af, Atten= 38%, Lag= 8.7 min
 Primary = 11.20 cfs @ 12.27 hrs, Volume= 0.556 af
 Secondary = 0.66 cfs @ 10.97 hrs, Volume= 0.993 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 106.04' Storage= 17,955 cf

Plug-Flow detention time= 169.4 min calculated for 1.549 af (100% of inflow)

Elevation (feet)	Cum.Store (cubic-feet)
102.30	0
102.80	1,555
103.30	4,901
103.80	8,103
104.30	11,084
104.80	13,722
105.30	15,672
105.80	17,227
106.30	18,774
106.80	18,775
107.30	18,776

Primary OutFlow Max=11.19 cfs @ 12.27 hrs HW=106.04' (Free Discharge)

↑1=Broad-Crested Rectangular Weir (Controls 11.19 cfs)

Secondary OutFlow Max=0.66 cfs @ 10.97 hrs HW=102.35' (Free Discharge)

↑2=Underdrain (Controls 0.66 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	105.30'	5.5' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
2	Secondary	0.00'	0.66 cfs Underdrain at all elevations

Link SP1: Analysis Point 4

Inflow Area = 16.613 ac, Inflow Depth = 1.34"

Inflow = 13.34 cfs @ 12.27 hrs, Volume= 1.850 af

Primary = 13.34 cfs @ 12.27 hrs, Volume= 1.850 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS, Type III 24-hr Rainfall=4.70"

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A1: AVESTA SUBCATCHMENT A1

Runoff Area=19,288 sf Runoff Depth=3.59"

Length=70' Tc=4.1 min CN=90 Runoff= 1.93 cfs 0.132 af

Subcatchment A2: AVESTA SUBCATCHMENT A2

Runoff Area=7,545 sf Runoff Depth=3.59"

Length=40' Tc=0.6 min CN=90 Runoff= 0.85 cfs 0.052 af

Subcatchment A3: AVESTA SUBCATCHMENT A3

Runoff Area=3,222 sf Runoff Depth=4.46"

Length=22' Tc=0.2 min CN=98 Runoff= 0.41 cfs 0.028 af

Subcatchment OS: Off-site Drainage Area

Runoff Area=274,428 sf Runoff Depth=2.05"

Length=967' Tc=9.7 min CN=73 Runoff= 13.16 cfs 1.075 af

Subcatchment V1: VLF SUBCATCHMENT 1

Runoff Area=302,380 sf Runoff Depth=3.49"

Length=865' Tc=8.2 min CN=89 Runoff= 25.67 cfs 2.016 af

Subcatchment V2: VLF - POST 2

Runoff Area=116,804 sf Runoff Depth=2.29"

Length=208' Tc=4.0 min CN=76 Runoff= 7.72 cfs 0.512 af

Reach 1R: Avesta Reach 1

Peak Depth= 0.62' Max Vel= 3.8 fps Inflow= 1.93 cfs 0.132 af

D=12.0" n=0.012 L=88.0' S=0.0050 '/' Capacity=2.73 cfs Outflow= 1.92 cfs 0.132 af

Reach 2R: Avesta Reach 2

Peak Depth= 0.58' Max Vel= 5.3 fps Inflow= 2.51 cfs 0.184 af

D=12.0" n=0.012 L=45.0' S=0.0102 '/' Capacity=3.90 cfs Outflow= 2.51 cfs 0.184 af

Reach 3R: Avesta Reach 3

Peak Depth= 0.45' Max Vel= 8.1 fps Inflow= 2.78 cfs 0.212 af

D=12.0" n=0.012 L=86.0' S=0.0294 '/' Capacity=6.62 cfs Outflow= 2.78 cfs 0.212 af

Reach BP: Bypass

Peak Depth= 1.61' Max Vel= 9.2 fps Inflow= 33.93 cfs 1.878 af

D=30.0" n=0.012 L=70.0' S=0.0086 '/' Capacity=41.14 cfs Outflow= 30.64 cfs 1.878 af

Reach EX: Existing Culvert

Peak Depth= 1.50' Max Vel= 3.7 fps Inflow= 13.16 cfs 1.075 af

D=18.0" n=0.024 L=45.0' S=0.0100 '/' Capacity=5.69 cfs Outflow= 5.98 cfs 1.075 af

Reach UD: Underdrain

Peak Depth= 0.50' Max Vel= 3.5 fps Inflow= 0.66 cfs 1.213 af

D=6.0" n=0.012 L=160.0' S=0.0100 '/' Capacity=0.61 cfs Outflow= 0.65 cfs 1.213 af

Pond A: Avesta Underground Storage

Peak Storage= 4,338 cf @ 112.44' Inflow= 2.78 cfs 0.188 af

Primary= 0.36 cfs 0.167 af Outflow= 0.36 cfs 0.167 af

Pond IR: Avesta Isolator Row

Peak Storage= 1,055 cf @ 113.88' Inflow= 2.78 cfs 0.212 af

Primary= 2.78 cfs 0.188 af Outflow= 2.78 cfs 0.188 af

Pond UG: UNDERGROUND DETENTION V1

Peak Storage= 18,775 cf @ 106.81' Inflow= 31.36 cfs 3.091 af

Primary= 33.93 cfs 1.878 af Secondary= 0.66 cfs 1.213 af Outflow= 34.59 cfs 3.091 af

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POST DRAINAGE 05-29-07

Type III 24-hr Rainfall=4.70"

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Link SP1: Analysis Point 4

Inflow= 37.79 cfs 3.770 af

Primary= 37.79 cfs 3.770 af

Total Runoff Area = 16.613 ac Runoff Volume = 3.815 af Average Runoff Depth = 2.76"

VIL_RESP03102

Subcatchment A1: AVESTA SUBCATCHMENT A1

Runoff = 1.93 cfs @ 12.06 hrs, Volume= 0.132 af, Depth= 3.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=4.70"

Area (sf)	CN	Description
12,589	98	Paved parking & roofs
6,699	74	>75% Grass cover, Good, HSG C
19,288	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	20	0.0300	0.1		Sheet Flow, A TO B Grass: Dense n= 0.240 P2= 3.00"
0.6	50	0.0050	1.4		Shallow Concentrated Flow, B TO C Paved Kv= 20.3 fps
4.1	70	Total			

Subcatchment A2: AVESTA SUBCATCHMENT A2

Runoff = 0.85 cfs @ 12.01 hrs, Volume= 0.052 af, Depth= 3.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=4.70"

Area (sf)	CN	Description
2,637	74	>75% Grass cover, Good, HSG C
4,908	98	Paved parking & roofs
7,545	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	40	0.0175	1.1		Sheet Flow, A TO B Smooth surfaces n= 0.011 P2= 3.00"

Subcatchment A3: AVESTA SUBCATCHMENT A3

Runoff = 0.41 cfs @ 12.00 hrs, Volume= 0.028 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=4.70"

Area (sf)	CN	Description
3,222	98	Paved parking & roofs

POST DRAINAGE 06-29-07

Type III 24-hr Rainfall=4.70"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	22	0.0830	1.7		Sheet Flow, A TO B Smooth surfaces n= 0.011 P2= 3.00"

Subcatchment OS: Off-site Drainage Area

Runoff = 13.16 cfs @ 12.14 hrs, Volume= 1.075 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=4.70"

Area (sf)	CN	Description
205,821	65	Brush, Good, HSG C
68,607	98	Paved parking & roofs
274,428	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	100	0.0700	0.3		Sheet Flow, SHEET Range n= 0.130 P2= 3.00"
3.4	375	0.0700	1.9		Shallow Concentrated Flow, Shallow Conc. Flow Short Grass Pasture Kv= 7.0 fps
0.8	492	0.0250	10.3	18.59	Channel Flow, Pipe Flow Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
9.7	967	Total			

Subcatchment V1: VLF SUBCATCHMENT 1

Runoff = 25.67 cfs @ 12.11 hrs, Volume= 2.016 af, Depth= 3.49"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=4.70"

Area (sf)	CN	Description
205,685	98	Paved parking & roofs
62,411	74	>75% Grass cover, Good, HSG C
5,620	80	>75% Grass cover, Good, HSG D
28,664	61	>75% Grass cover, Good, HSG B
302,380	89	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	40	0.0500	0.2		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.00"
3.7	315	0.0050	1.4		Shallow Concentrated Flow, B-C Paved Kv= 20.3 fps
1.1	510	0.0150	8.0	14.40	Channel Flow, C-D Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
8.2	865	Total			

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Subcatchment V2: VLF - POST 2

Runoff = 7.72 cfs @ 12.06 hrs, Volume= 0.512 af, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=4.70"

Area (sf)	CN	Description
17,819	98	Paved parking & roofs
87,691	74	>75% Grass cover, Good, HSG C
11,294	61	>75% Grass cover, Good, HSG B
116,804	76	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	45	0.0900	0.3		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.00"
1.1	163	0.1160	2.4		Shallow Concentrated Flow, B-C Short Grass Pasture Kv= 7.0 fps
4.0	208	Total			

Reach 1R: Avesta Reach 1

Inflow Area = 0.443 ac, Inflow Depth = 3.59"
 Inflow = 1.93 cfs @ 12.06 hrs, Volume= 0.132 af
 Outflow = 1.92 cfs @ 12.07 hrs, Volume= 0.132 af, Atten= 1%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 3.8 fps, Min. Travel Time= 0.4 min
 Avg. Velocity = 1.3 fps, Avg. Travel Time= 1.2 min

Peak Depth= 0.62'
 Capacity at bank full= 2.73 cfs
 Inlet Invert= 117.80', Outlet Invert= 117.36'
 12.0" Diameter Pipe n= 0.012 Length= 88.0' Slope= 0.0050 '/'

Reach 2R: Avesta Reach 2

Inflow Area = 0.616 ac, Inflow Depth = 3.59"
 Inflow = 2.51 cfs @ 12.06 hrs, Volume= 0.184 af
 Outflow = 2.51 cfs @ 12.06 hrs, Volume= 0.184 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 5.3 fps, Min. Travel Time= 0.1 min
 Avg. Velocity = 1.8 fps, Avg. Travel Time= 0.4 min

Peak Depth= 0.58'
Capacity at bank full= 3.90 cfs
Inlet Invert= 117.10', Outlet Invert= 116.64'
12.0" Diameter Pipe n= 0.012 Length= 45.0' Slope= 0.0102 1/'

Reach 3R: Avesta Reach 3

Inflow Area = 0.690 ac, Inflow Depth = 3.68"
Inflow = 2.78 cfs @ 12.06 hrs, Volume= 0.212 af
Outflow = 2.78 cfs @ 12.06 hrs, Volume= 0.212 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.1 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.5 fps, Avg. Travel Time= 0.6 min

Peak Depth= 0.45'
Capacity at bank full= 6.62 cfs
Inlet Invert= 116.20', Outlet Invert= 113.67'
12.0" Diameter Pipe n= 0.012 Length= 86.0' Slope= 0.0294 1/'

Reach BP: Bypass

Inflow Area = 13.242 ac, Inflow Depth = 1.70"
Inflow = 33.93 cfs @ 12.12 hrs, Volume= 1.878 af
Outflow = 30.64 cfs @ 12.12 hrs, Volume= 1.878 af, Atten= 10%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 9.2 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.4 fps, Avg. Travel Time= 0.3 min

Peak Depth= 1.61'
Capacity at bank full= 41.14 cfs
Inlet Invert= 102.80', Outlet Invert= 102.20'
30.0" Diameter Pipe n= 0.012 Length= 70.0' Slope= 0.0086 1/'

Reach EX: Existing Culvert

Inflow Area = 6.300 ac, Inflow Depth = 2.05"
Inflow = 13.16 cfs @ 12.14 hrs, Volume= 1.075 af
Outflow = 5.98 cfs @ 12.01 hrs, Volume= 1.075 af, Atten= 55%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.7 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.9 fps, Avg. Travel Time= 0.4 min

Peak Depth= 1.50'
Capacity at bank full= 5.69 cfs
18.0" Diameter Pipe n= 0.024 Length= 45.0' Slope= 0.0100 1/'

Reach UD: Underdrain

Inflow = 0.66 cfs @ 9.49 hrs, Volume= 1.213 af
 Outflow = 0.65 cfs @ 9.52 hrs, Volume= 1.213 af, Atten= 1%, Lag= 1.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 3.5 fps, Min. Travel Time= 0.8 min

Avg. Velocity = 2.9 fps, Avg. Travel Time= 0.9 min

Peak Depth= 0.50'

Capacity at bank full= 0.61 cfs

Inlet Invert= 99.60', Outlet Invert= 98.00'

6.0" Diameter Pipe n= 0.012 Length= 160.0' Slope= 0.0100 1'

Pond A: Avesta Underground Storage

Inflow Area = 0.690 ac, Inflow Depth = 3.26"
 Inflow = 2.78 cfs @ 12.06 hrs, Volume= 0.188 af
 Outflow = 0.36 cfs @ 12.61 hrs, Volume= 0.167 af, Atten= 87%, Lag= 33.0 min
 Primary = 0.36 cfs @ 12.61 hrs, Volume= 0.167 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 112.44' Storage= 4,338 cf

Plug-Flow detention time= 323.1 min calculated for 0.167 af (89% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
110.00	0	0
111.00	1,798	1,798
112.00	1,798	3,596
113.00	1,698	5,294
113.50	100	5,394

Primary OutFlow Max=0.36 cfs @ 12.61 hrs HW=112.44' (Free Discharge)

1=Orifice/Grate (Controls 0.14 cfs)

2=Orifice/Grate (Controls 0.22 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	110.50'	2.0" Vert. Orifice/Grate C= 0.600
2	Primary	112.00'	4.0" Vert. Orifice/Grate C= 0.600

Pond IR: Avesta Isolator Row

Inflow Area = 0.690 ac, Inflow Depth = 3.68"
 Inflow = 2.78 cfs @ 12.06 hrs, Volume= 0.212 af
 Outflow = 2.78 cfs @ 12.06 hrs, Volume= 0.188 af, Atten= 0%, Lag= 0.0 min
 Primary = 2.78 cfs @ 12.06 hrs, Volume= 0.188 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

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POST DRAINAGE 05-29-07

Type III 24-hr Rainfall=4.70"

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Peak Elev= 113.88' Storage= 1,055 cf

Plug-Flow detention time= 85.7 min calculated for 0.188 af (89% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
110.00	0	0
111.00	350	350
112.00	350	700
113.00	300	1,000
113.50	50	1,050
114.00	6	1,056
115.00	6	1,062
116.00	6	1,068
118.00	6	1,074

Primary OutFlow Max=2.76 cfs @ 12.06 hrs HW=113.88' (Free Discharge)

1=Broad-Crested Rectangular Weir (Controls 2.76 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	113.50'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir
			Head (feet) 0.20 0.40 0.60 0.80 1.00
			Coef. (English) 2.80 2.92 3.08 3.30 3.32

Pond UG: UNDERGROUND DETENTION V1

Inflow Area = 13.242 ac, Inflow Depth = 2.80"

Inflow = 31.36 cfs @ 12.11 hrs, Volume= 3.091 af

Outflow = 34.59 cfs @ 12.12 hrs, Volume= 3.091 af, Atten= 0%, Lag= 0.4 min

Primary = 33.93 cfs @ 12.12 hrs, Volume= 1.878 af

Secondary = 0.66 cfs @ 9.49 hrs, Volume= 1.213 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 106.81' Storage= 18,775 cf

Plug-Flow detention time= 110.7 min calculated for 3.091 af (100% of inflow)

Elevation (feet)	Cum.Store (cubic-feet)
102.30	0
102.80	1,555
103.30	4,901
103.80	8,103
104.30	11,084
104.80	13,722
105.30	15,672
105.80	17,227
106.30	18,774
106.80	18,775
107.30	18,776

VIL_RESP03108

POST DRAINAGE 05-29-07

Type III 24-hr Rainfall=4.70"

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Primary OutFlow Max=33.84 cfs @ 12.12 hrs HW=106.81' (Free Discharge)

1=Broad-Crested Rectangular Weir (Controls 33.84 cfs)

Secondary OutFlow Max=0.66 cfs @ 9.49 hrs HW=102.35' (Free Discharge)

2=Underdrain (Controls 0.66 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	105.30'	5.5' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
2	Secondary	0.00'	0.66 cfs Underdrain at all elevations

Link SP1: Analysis Point 4

Inflow Area = 16.613 ac, Inflow Depth = 2.72"

Inflow = 37.79 cfs @ 12.10 hrs, Volume= 3.770 af

Primary = 37.79 cfs @ 12.10 hrs, Volume= 3.770 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS, Type III 24-hr Rainfall=5.50"

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A1: AVESTA SUBCATCHMENT A1

Runoff Area=19,288 sf Runoff Depth=4.36"

Length=70' Tc=4.1 min CN=90 Runoff= 2.32 cfs 0.161 af

Subcatchment A2: AVESTA SUBCATCHMENT A2

Runoff Area=7,545 sf Runoff Depth=4.36"

Length=40' Tc=0.6 min CN=90 Runoff= 1.03 cfs 0.063 af

Subcatchment A3: AVESTA SUBCATCHMENT A3

Runoff Area=3,222 sf Runoff Depth=5.26"

Length=22' Tc=0.2 min CN=98 Runoff= 0.48 cfs 0.032 af

Subcatchment OS: Off-site Drainage Area

Runoff Area=274,428 sf Runoff Depth=2.68"

Length=967' Tc=9.7 min CN=73 Runoff= 17.37 cfs 1.406 af

Subcatchment V1: VLF SUBCATCHMENT 1

Runoff Area=302,380 sf Runoff Depth=4.25"

Length=865' Tc=8.2 min CN=89 Runoff= 31.02 cfs 2.460 af

Subcatchment V2: VLF - POST 2

Runoff Area=116,804 sf Runoff Depth=2.95"

Length=208' Tc=4.0 min CN=76 Runoff= 9.99 cfs 0.660 af

Reach 1R: Avesta Reach 1

Peak Depth= 0.71' Max Vel= 3.9 fps Inflow= 2.32 cfs 0.161 af

D=12.0" n=0.012 L=88.0' S=0.0050 ' Capacity=2.73 cfs Outflow= 2.31 cfs 0.161 af

Reach 2R: Avesta Reach 2

Peak Depth= 0.66' Max Vel= 5.5 fps Inflow= 3.02 cfs 0.224 af

D=12.0" n=0.012 L=45.0' S=0.0102 ' Capacity=3.90 cfs Outflow= 3.02 cfs 0.224 af

Reach 3R: Avesta Reach 3

Peak Depth= 0.50' Max Vel= 8.4 fps Inflow= 3.34 cfs 0.256 af

D=12.0" n=0.012 L=86.0' S=0.0294 ' Capacity=6.62 cfs Outflow= 3.34 cfs 0.256 af

Reach BP: Bypass

Peak Depth= 1.81' Max Vel= 9.4 fps Inflow= 37.25 cfs 2.599 af

D=30.0" n=0.012 L=70.0' S=0.0086 ' Capacity=41.14 cfs Outflow= 36.01 cfs 2.599 af

Reach EX: Existing Culvert

Peak Depth= 1.50' Max Vel= 3.7 fps Inflow= 17.37 cfs 1.406 af

D=18.0" n=0.024 L=45.0' S=0.0100 ' Capacity=5.69 cfs Outflow= 6.04 cfs 1.406 af

Reach UD: Underdrain

Peak Depth= 0.50' Max Vel= 3.5 fps Inflow= 0.66 cfs 1.268 af

D=6.0" n=0.012 L=160.0' S=0.0100 ' Capacity=0.61 cfs Outflow= 0.65 cfs 1.268 af

Pond A: Avesta Underground Storage

Peak Storage= 5,227 cf @ 112.96' Inflow= 3.34 cfs 0.232 af

Primary= 0.54 cfs 0.211 af Outflow= 0.54 cfs 0.211 af

Pond IR: Avesta Isolator Row

Peak Storage= 1,055 cf @ 113.93' Inflow= 3.34 cfs 0.256 af

Primary= 3.34 cfs 0.232 af Outflow= 3.34 cfs 0.232 af

Pond UG: UNDERGROUND DETENTION V1 Peak Storage= 18,775 cf @ 106.91' Inflow= 36.71 cfs 3.866 af

Primary= 37.25 cfs 2.599 af Secondary= 0.66 cfs 1.268 af Outflow= 3.34 cfs 0.232 af

VIL_RESP03110

POST DRAINAGE 05-29-07

Type III 24-hr Rainfall=5.50"

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Link SP1: Analysis Point 4

Inflow= 45.11 cfs 4.737 af

Primary= 45.11 cfs 4.737 af

Total Runoff Area = 16.613 ac Runoff Volume = 4.782 af Average Runoff Depth = 3.45"

VIL_RESP03111

Subcatchment A1: AVESTA SUBCATCHMENT A1

Runoff = 2.32 cfs @ 12.06 hrs, Volume= 0.161 af, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
12,589	98	Paved parking & roofs
6,699	74	>75% Grass cover, Good, HSG C
19,288	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	20	0.0300	0.1		Sheet Flow, A TO B Grass: Dense n= 0.240 P2= 3.00"
0.6	50	0.0050	1.4		Shallow Concentrated Flow, B TO C Paved Kv= 20.3 fps
4.1	70	Total			

Subcatchment A2: AVESTA SUBCATCHMENT A2

Runoff = 1.03 cfs @ 12.01 hrs, Volume= 0.063 af, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
2,637	74	>75% Grass cover, Good, HSG C
4,908	98	Paved parking & roofs
7,545	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	40	0.0175	1.1		Sheet Flow, A TO B Smooth surfaces n= 0.011 P2= 3.00"

Subcatchment A3: AVESTA SUBCATCHMENT A3

Runoff = 0.48 cfs @ 12.00 hrs, Volume= 0.032 af, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
3,222	98	Paved parking & roofs

POST DRAINAGE 05-29-07

Type III 24-hr Rainfall=5.50"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	22	0.0830	1.7		Sheet Flow, A TO B Smooth surfaces n= 0.011 P2= 3.00"

Subcatchment OS: Off-site Drainage Area

Runoff = 17.37 cfs @ 12.14 hrs, Volume= 1.406 af, Depth= 2.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
205,821	65	Brush, Good, HSG C
68,607	98	Paved parking & roofs
274,428	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	100	0.0700	0.3		Sheet Flow, SHEET Range n= 0.130 P2= 3.00"
3.4	375	0.0700	1.9		Shallow Concentrated Flow, Shallow Conc. Flow Short Grass Pasture Kv= 7.0 fps
0.8	492	0.0250	10.3	18.59	Channel Flow, Pipe Flow Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
9.7	967	Total			

Subcatchment V1: VLF SUBCATCHMENT 1

Runoff = 31.02 cfs @ 12.11 hrs, Volume= 2.460 af, Depth= 4.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
205,685	98	Paved parking & roofs
62,411	74	>75% Grass cover, Good, HSG C
5,620	80	>75% Grass cover, Good, HSG D
28,664	61	>75% Grass cover, Good, HSG B
302,380	89	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	40	0.0500	0.2		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.00"
3.7	315	0.0050	1.4		Shallow Concentrated Flow, B-C Paved Kv= 20.3 fps
1.1	510	0.0150	8.0	14.40	Channel Flow, C-D Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
8.2	865	Total			

VIL_RESP03113

Subcatchment V2: VLF - POST 2

Runoff = 9.99 cfs @ 12.06 hrs, Volume= 0.660 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
17,819	98	Paved parking & roofs
87,691	74	>75% Grass cover, Good, HSG C
11,294	61	>75% Grass cover, Good, HSG B
116,804	76	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	45	0.0900	0.3		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 3.00"
1.1	163	0.1160	2.4		Shallow Concentrated Flow, B-C
					Short Grass Pasture Kv= 7.0 fps
4.0	208	Total			

Reach 1R: Avesta Reach 1

Inflow Area = 0.443 ac, Inflow Depth = 4.36"
Inflow = 2.32 cfs @ 12.06 hrs, Volume= 0.161 af
Outflow = 2.31 cfs @ 12.07 hrs, Volume= 0.161 af, Atten= 1%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.9 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.3 fps, Avg. Travel Time= 1.1 min

Peak Depth= 0.71'
Capacity at bank full= 2.73 cfs
Inlet Invert= 117.80', Outlet Invert= 117.36'
12.0" Diameter Pipe n= 0.012 Length= 88.0' Slope= 0.0050 '/'

Reach 2R: Avesta Reach 2

Inflow Area = 0.616 ac, Inflow Depth = 4.36"
Inflow = 3.02 cfs @ 12.06 hrs, Volume= 0.224 af
Outflow = 3.02 cfs @ 12.06 hrs, Volume= 0.224 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.5 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.9 fps, Avg. Travel Time= 0.4 min

Peak Depth= 0.66'
Capacity at bank full= 3.90 cfs
Inlet Invert= 117.10', Outlet Invert= 116.64'
12.0" Diameter Pipe n= 0.012 Length= 45.0' Slope= 0.0102 1/'

Reach 3R: Avesta Reach 3

Inflow Area = 0.690 ac, Inflow Depth = 4.46"
Inflow = 3.34 cfs @ 12.06 hrs, Volume= 0.256 af
Outflow = 3.34 cfs @ 12.06 hrs, Volume= 0.256 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.4 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.6 fps, Avg. Travel Time= 0.5 min

Peak Depth= 0.50'
Capacity at bank full= 6.62 cfs
Inlet Invert= 116.20', Outlet Invert= 113.67'
12.0" Diameter Pipe n= 0.012 Length= 86.0' Slope= 0.0294 1/'

Reach BP: Bypass

Inflow Area = 13.242 ac, Inflow Depth = 2.35"
Inflow = 37.25 cfs @ 12.11 hrs, Volume= 2.599 af
Outflow = 36.01 cfs @ 12.12 hrs, Volume= 2.599 af, Atten= 3%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 9.4 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.5 fps, Avg. Travel Time= 0.3 min

Peak Depth= 1.81'
Capacity at bank full= 41.14 cfs
Inlet Invert= 102.80', Outlet Invert= 102.20'
30.0" Diameter Pipe n= 0.012 Length= 70.0' Slope= 0.0086 1/'

Reach EX: Existing Culvert

Inflow Area = 6.300 ac, Inflow Depth = 2.68"
Inflow = 17.37 cfs @ 12.14 hrs, Volume= 1.406 af
Outflow = 6.04 cfs @ 11.95 hrs, Volume= 1.406 af, Atten= 65%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.7 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.0 fps, Avg. Travel Time= 0.4 min

Peak Depth= 1.50'
Capacity at bank full= 5.69 cfs
18.0" Diameter Pipe n= 0.024 Length= 45.0' Slope= 0.0100 1/'

Reach UD: Underdrain

Inflow = 0.66 cfs @ 8.93 hrs, Volume= 1.268 af
 Outflow = 0.65 cfs @ 8.96 hrs, Volume= 1.268 af, Atten= 1%, Lag= 1.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 3.5 fps, Min. Travel Time= 0.8 min

Avg. Velocity= 3.0 fps, Avg. Travel Time= 0.9 min

Peak Depth= 0.50'

Capacity at bank full= 0.61 cfs

Inlet Invert= 99.60', Outlet Invert= 98.00'

6.0" Diameter Pipe n= 0.012 Length= 160.0' Slope= 0.0100 1'

Pond A: Avesta Underground Storage

Inflow Area = 0.690 ac, Inflow Depth = 4.04"
 Inflow = 3.34 cfs @ 12.06 hrs, Volume= 0.232 af
 Outflow = 0.54 cfs @ 12.54 hrs, Volume= 0.211 af, Atten= 84%, Lag= 28.6 min
 Primary = 0.54 cfs @ 12.54 hrs, Volume= 0.211 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 112.96' Storage= 5,227 cf

Plug-Flow detention time= 285.4 min calculated for 0.211 af (91% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
110.00	0	0
111.00	1,798	1,798
112.00	1,798	3,596
113.00	1,698	5,294
113.50	100	5,394

Primary OutFlow Max=0.54 cfs @ 12.54 hrs HW=112.96' (Free Discharge)

1=Orifice/Grate (Controls 0.16 cfs)

2=Orifice/Grate (Controls 0.37 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	110.50'	2.0" Vert. Orifice/Grate C= 0.600
2	Primary	112.00'	4.0" Vert. Orifice/Grate C= 0.600

Pond IR: Avesta Isolator Row

Inflow Area = 0.690 ac, Inflow Depth = 4.46"
 Inflow = 3.34 cfs @ 12.06 hrs, Volume= 0.256 af
 Outflow = 3.34 cfs @ 12.06 hrs, Volume= 0.232 af, Atten= 0%, Lag= 0.0 min
 Primary = 3.34 cfs @ 12.06 hrs, Volume= 0.232 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

VIL_RESP03116

POST DRAINAGE 05-29-07

Type III 24-hr Rainfall=5.50"

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Peak Elev= 113.93' Storage= 1,055 cf

Plug-Flow detention time= 76.1 min calculated for 0.232 af (91% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
110.00	0	0
111.00	350	350
112.00	350	700
113.00	300	1,000
113.50	50	1,050
114.00	6	1,056
115.00	6	1,062
116.00	6	1,068
118.00	6	1,074

Primary OutFlow Max=3.33 cfs @ 12.06 hrs HW=113.93' (Free Discharge)

1=Broad-Crested Rectangular Weir (Controls 3.33 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	113.50'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Pond UG: UNDERGROUND DETENTION V1

Inflow Area = 13.242 ac, Inflow Depth = 3.50"
 Inflow = 36.71 cfs @ 12.11 hrs, Volume= 3.866 af
 Outflow = 37.91 cfs @ 12.11 hrs, Volume= 3.866 af, Atten= 0%, Lag= 0.0 min
 Primary = 37.25 cfs @ 12.11 hrs, Volume= 2.599 af
 Secondary = 0.66 cfs @ 8.93 hrs, Volume= 1.268 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 106.91' Storage= 18,775 cf

Plug-Flow detention time= 93.7 min calculated for 3.866 af (100% of inflow)

Elevation (feet)	Cum.Store (cubic-feet)
102.30	0
102.80	1,555
103.30	4,901
103.80	8,103
104.30	11,084
104.80	13,722
105.30	15,672
105.80	17,227
106.30	18,774
106.80	18,775
107.30	18,776

VIL_RESP03117

Primary OutFlow Max=37.19 cfs @ 12.11 hrs HW=106.91' (Free Discharge)

1=Broad-Crested Rectangular Weir (Controls 37.19 cfs)

Secondary OutFlow Max=0.66 cfs @ 8.93 hrs HW=102.35' (Free Discharge)

2=Underdrain (Controls 0.66 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	105.30'	5.5' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
2	Secondary	0.00'	0.66 cfs Underdrain at all elevations

Link SP1: Analysis Point 4

Inflow Area = 16.613 ac, Inflow Depth = 3.42"

Inflow = 45.11 cfs @ 12.10 hrs, Volume= 4.737 af

Primary = 45.11 cfs @ 12.10 hrs, Volume= 4.737 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Appendix D
Treatment Level Calculations and Plan

NORTHEAST CIVIL SOLUTIONS, INC.

Surveying Engineering Land Planning

53 U.S. Route 1, Scarborough, Maine 04074

Tel: 207-883-1000 • Fax: 207-883-1001

PROJECT VLF

SHEET NO. 7

OF

CALCULATED BY DAC

DATE

CHECKED BY

DATE

SCALE

STORMWATER TREATMENT CALCULATIONS

TOTAL LOT AREA = 8.03 ac = 342,727 sf

DISTRICT AREA = 331,056 sf

TOTAL IMPERVIOUS AREA ON SITE = 194,416 sf

TOTAL IMPERVIOUS AREAS TREATED = 192,348 sf

% AREA TREATED = 98% > 95% REQ'D - OK -

TOTAL UNDEVELOPED AREA ON SITE = 319,464 sf

TOTAL DEVELOPED AREA TREATED = 269,425 sf

% AREA TREATED = 84% > 80% REQ'D - OK -

VIL_RESP03120

HRC - VILLAGE AT LITTLE FALLS WINDHAM, MAINE

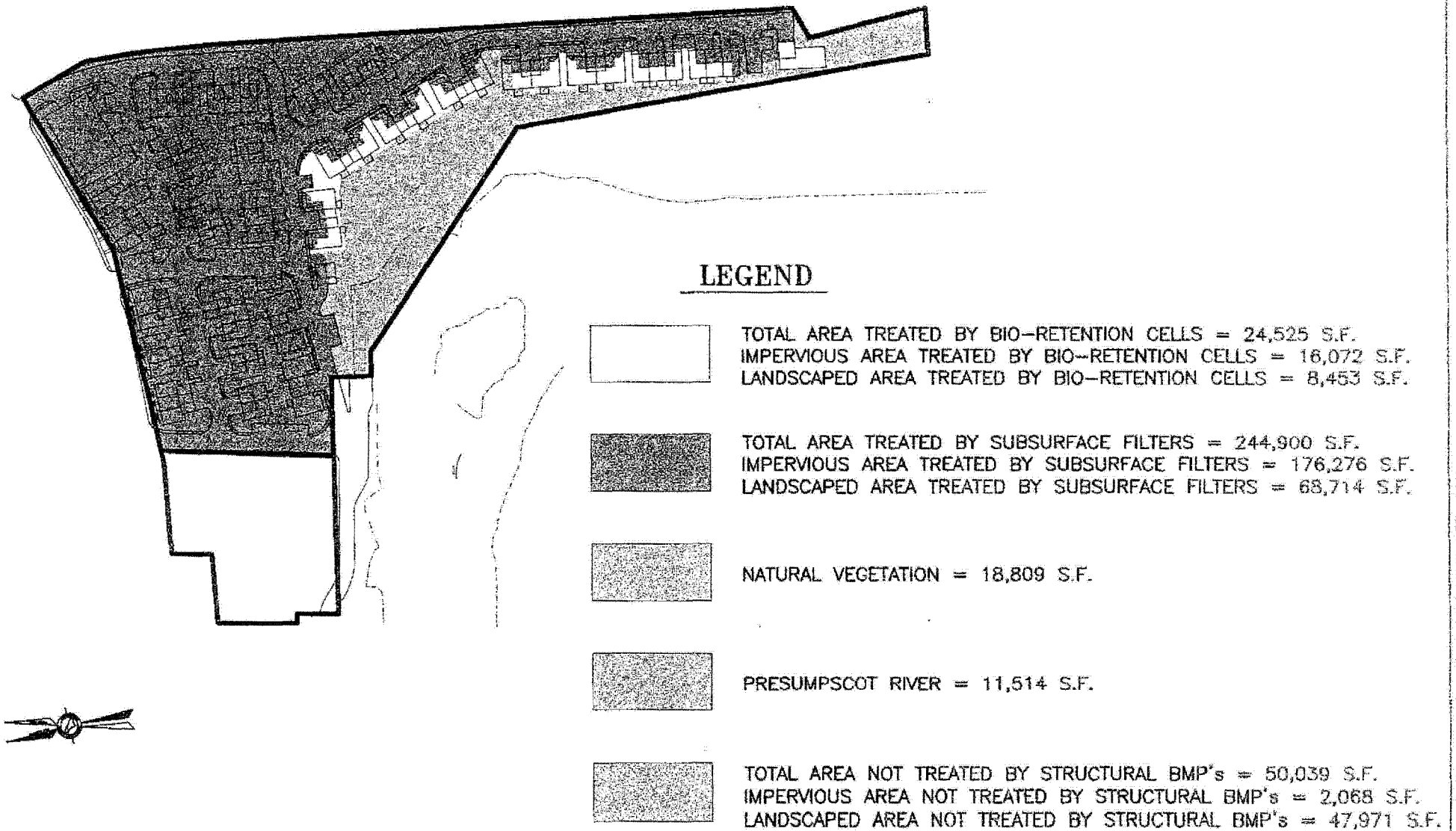


FIGURE 1

TREATMENT PLAN
FOR DEVELOPED AREA

VIL_RESP03121

SCALE: 1" = 200'

E:\LAND PROJECT\28000\28025-HRC-VILLAGE\PLANSET\28025-DCF-AREAS

Appendix E
Subsurface Soil Filter Calculations

NORTHEAST CIVIL SOLUTIONS, INC.

Surveying Engineering Land Planning

53 U.S. Route 1, Scarborough, Maine 04074

Tel: 207-883-1000 • Fax: 207-883-1001

PROJECT _____

SHEET NO. 2

OF _____

CALCULATED BY _____

DATE _____

CHECKED BY _____

DATE _____

SCALE _____

SUBSURFACE SOIL FILTER - WATER QUALITY VOLUME (WQV)

TOTAL AREA OF IMPERVIOUS TREATED BY FILTER = 176,376 ft^2

TOTAL AREA OF LANDSCAPING TREATED BY FILTER = 68,714 ft^2

$$WQV = (1" \text{ IMPERVIOUS}) + (0.4" \times \text{LANDSCAPING})$$

$$= (1" \times 1/12' \times 176,376) + (0.4' \times 1/2' \times 68,714)$$

$$= 16,980 \text{ ft}^3$$

STORMTECH SC-740 CHAMBERS WILL BE USED TO
STORE THE REQ'D WQV

A FULL SC-740 W/ 6" STONE BASE HAS A CAPACITY = 74.9 ft^3

$$\# \text{ OF UNITS REQ'D} = 16,980 / 74.9 \text{ ft}^3 = 227 \text{ CHAMBERS}$$

PROPOSE 10 ROWS OF 23 = 230 CHAMBERS

$$\text{PROPOSED WQV} = 230 \times 74.9 \text{ ft}^3 = 17,227 \text{ ft}^3 > 16,980 \text{ ft}^3 \text{ REQ'D - OK}$$

TREATMENT DIRECTION

THE FILTER MUST SLOWLY DISCHARGE WQV. DISCHARGE
TIME MUST BE BETWEEN 24 & 48 hrs

PROPOSED DISCHARGE TIME = 26 HOURS (SEE ATTACHED
HYDROGRAPH CHART)

SINCE 24 hrs < 26 hours < 48 hours, PROPOSED
DISCHARGE TIME IS OK

VIL_RESP03123

POST DRAINAGE 05-29-07

Type III 24-hr Rainfall=5.50"

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Hydrograph for Pond UG: UNDERGROUND DETENTION V1

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	102.30	0.00	0.00	0.00
1.00	0.00	0	102.30	0.00	0.00	0.00
2.00	0.00	0	102.30	0.00	0.00	0.00
3.00	0.00	0	102.30	0.00	0.00	0.00
4.00	0.00	0	102.30	0.00	0.00	0.00
5.00	0.05	10	102.30	0.04	0.00	0.04
6.00	0.12	26	102.31	0.11	0.00	0.11
7.00	0.23	52	102.32	0.22	0.00	0.22
8.00	0.39	90	102.33	0.38	0.00	0.38
9.00	0.73	168	102.35	0.66	0.00	0.66
10.00	1.34	1,450	102.77	0.66	0.00	0.66
11.00	2.53	5,839	103.45	0.66	0.00	0.66
12.00	22.61	18,774	106.38	21.30	20.64	0.66
13.00	8.76	17,582	105.91	8.88	8.22	0.66
14.00	3.28	16,632	105.61	3.37	2.71	0.66
15.00	2.48	16,429	105.54	2.53	1.87	0.66
16.00	1.76	16,226	105.48	1.83	1.17	0.66
17.00	1.39	16,090	105.43	1.43	0.77	0.66
18.00	1.08	15,968	105.40	1.12	0.46	0.66
19.00	0.95	15,893	105.37	0.96	0.30	0.66
20.00	0.86	15,846	105.36	0.87	0.21	0.66
21.00	0.78	15,798	105.34	0.80	0.14	0.66
22.00	0.71	15,734	105.32	0.73	0.07	0.66
23.00	0.64	15,668	105.30	0.66	0.00	0.66
24.00	0.57	15,460	105.25	0.66	0.00	0.66
25.00	0.00	13,370	104.73	0.66	0.00	0.66
26.00	0.00	10,994	104.28	0.66	0.00	0.66
27.00	0.00	8,618	103.89	0.66	0.00	0.66
28.00	0.00	6,242	103.51	0.66	0.00	0.66
29.00	0.00	3,866	103.15	0.66	0.00	0.66
30.00	0.00	1,490	102.78	0.66	0.00	0.66
31.00	0.00	0	102.30	0.00	0.00	0.00
32.00	0.00	0	102.30	0.00	0.00	0.00
33.00	0.00	0	102.30	0.00	0.00	0.00
34.00	0.00	0	102.30	0.00	0.00	0.00
35.00	0.00	0	102.30	0.00	0.00	0.00
36.00	0.00	0	102.30	0.00	0.00	0.00
37.00	0.00	0	102.30	0.00	0.00	0.00
38.00	0.00	0	102.30	0.00	0.00	0.00
39.00	0.00	0	102.30	0.00	0.00	0.00
40.00	0.00	0	102.30	0.00	0.00	0.00
41.00	0.00	0	102.30	0.00	0.00	0.00
42.00	0.00	0	102.30	0.00	0.00	0.00
43.00	0.00	0	102.30	0.00	0.00	0.00
44.00	0.00	0	102.30	0.00	0.00	0.00
45.00	0.00	0	102.30	0.00	0.00	0.00
46.00	0.00	0	102.30	0.00	0.00	0.00
7.00	0.00	0	102.30	0.00	0.00	0.00
48.00	0.00	0	102.30	0.00	0.00	0.00

Duration = 30 hrs - 4 hrs = 26 hrs
24 hours < 26 hours < 48 hours - OK

VIL_RESP03124

Appendix F
Bio-retention Cell Calculations

NORTHEAST CIVIL SOLUTIONS, INC.

Surveying Engineering Land Planning

53 U.S. Route 1, Scarborough, Maine 04074

Tel: 207-883-1000 • Fax: 207-883-1001

PROJECT _____

SHEET NO. _____

OF _____

CALCULATED BY _____

DATE _____

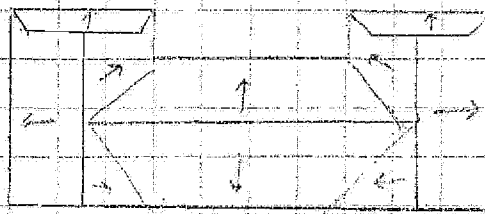
CHECKED BY _____

DATE _____

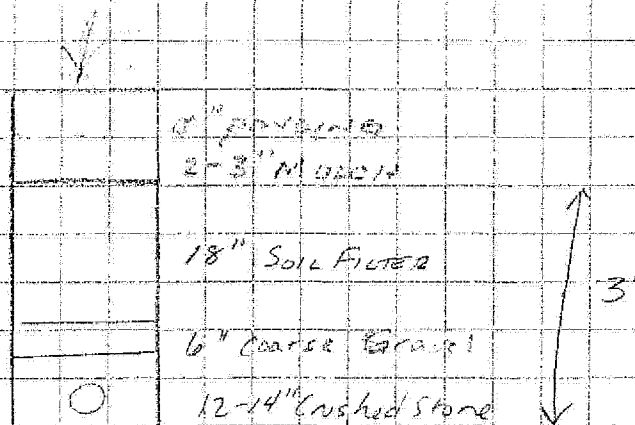
SCALE _____

BIORETENTION CELL DESIGN FOR TYPE C BLDGS

PODE LAYOUT



FILTER SECTION (TYPE)



1/3 of the filter area can be counted towards the Water Quality Volume

$$WQV_{\text{PROVIDED}} = \text{SURFACE AREA} \times 3' \text{ DEEP} \times \frac{1}{3}$$

$$WQV_{\text{REQ'D}} = \left[1' \times \frac{1'}{12"} \times (\text{Area of Impervious}) \right] + \left[0.4' \times \frac{1'}{12"} \times (\text{Area of Landscaped}) \right]$$

VIL_RESP03126

NORTHEAST CIVIL SOLUTIONS, INC.

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53 U.S. Route 1, Scarborough, Maine 04074

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PROJECT _____

SHEET NO. 2

OF _____

CALCULATED BY _____

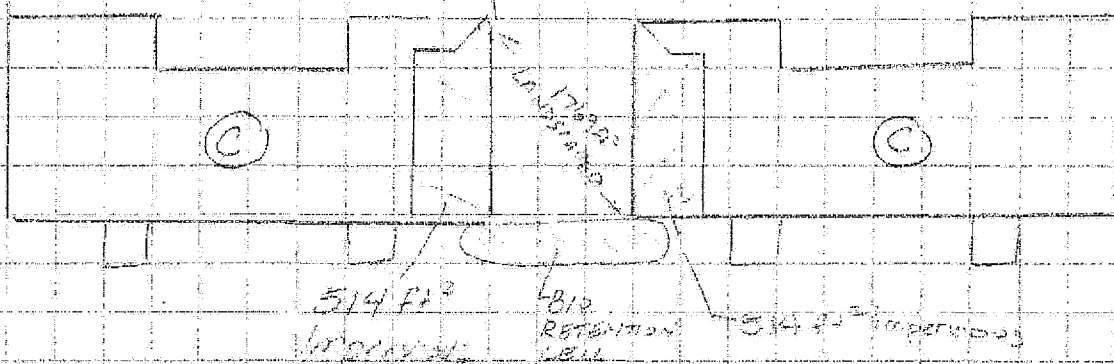
DATE _____

CHECKED BY _____

DATE _____

SCALE _____

Site Filter for Landscaped Run-off (5.26 cfs)



LARGEST LANDSCAPED AREA BETWEEN TYPE C BLDG IS IN BETWEEN UNITS 60 OF 4 6602. THIS LANDSCAPED AREA = 1769 sf

$$WQV_{REQ'D} \text{ BETWEEN TYPE C BLDGS} = (1" \times \frac{1}{12} \times 514 \times 2) + (0.4" \times \frac{1}{12} \times 1769) = 144.6 \text{ cf}$$

IF A 5' WIDE X 33' LONG BIO-RETENTION CELL WAS USED, THEN

$$WQV_{PROVIDED} = \left(\frac{1}{3} \times 5' \times 33' \times 3' \right) = 165 \text{ cf}$$

SINCE 165 cf > 144.6 cf, SIZE OF FILTER IS OK.

CHECK SURFACE AREA:

$$\begin{aligned} REQ'D \text{ SURFACE AREA} &= (0.05 \times \text{IMPERVIOUS}) + (0.02 \times \text{LANDSCAPED}) \\ &= (0.05 \times 2 \times 514) + (0.02 \times 1769 \text{ ft}^2) \\ &= 86.78 \text{ sf} \end{aligned}$$

$$\text{SURFACE AREA PROVIDED} = 5 \times 33 = 165 \text{ sf}$$

SINCE 165 sf > 86.78 sf - OK -

VIL_RESP03127

NORTHEAST CIVIL SOLUTIONS, INC.

Surveying Engineering Land Planning

53 U.S. Route 1, Scarborough, Maine 04074

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PROJECT _____

SHEET NO. 3

OF _____

CALCULATED BY _____

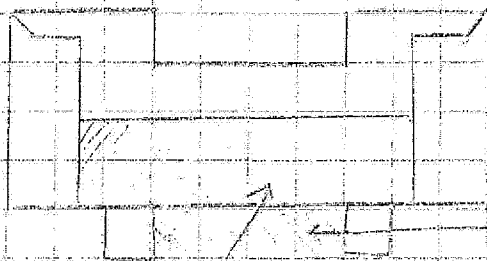
DATE _____

CHECKED BY _____

DATE _____

SCALE _____

SIZE FILTER AT REAR OF BLDG TYPE C

LANDSCAPED AREA = 168 ft²IMPERVIOUS AREA = 925 ft²

$$WQV_{REQ'D} = (1 \frac{1}{2} \times 925) + (0.4 \times \frac{1}{12} \times 168) = 82.68 \text{ cf}$$

IF A 5' WIDE * 20' LONG BIO RETENTION CELL IS PROPOSED

$$WQV_{PROPOSED} = (\frac{1}{3} \times 5' \times 20' \times 3') = 100 \text{ cf} > 82.68 \text{ cf} - \text{OK}$$

CHECK SURFACE AREA.

$$\begin{aligned} REQ'D \text{ SURFACE AREA} &= (0.05 \times IMPERVIOUS) + (0.02 \times LANDSCAPED) \\ &= (0.05 \times 925) + (0.02 \times 168) \\ &= 49.61 \text{ ft}^2 \end{aligned}$$

$$PROPOSED \text{ SURFACE AREA} = 5' \times 20' = 100 \text{ ft}^2 > 49.61 \text{ ft}^2 - \text{OK}$$

NORTHEAST CIVIL SOLUTIONS, INC.

Surveying Engineering Land Planning

153 U.S. Route 1, Scarborough, Maine 04074

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PROJECT _____

SHEET NO. 4

OF _____

CALCULATED BY _____

DATE _____

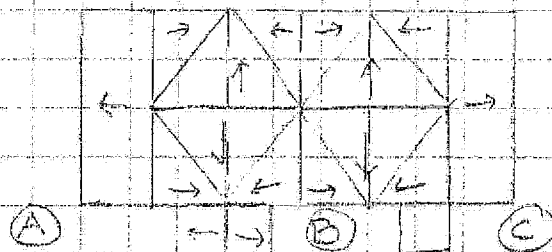
CHECKED BY _____

DATE _____

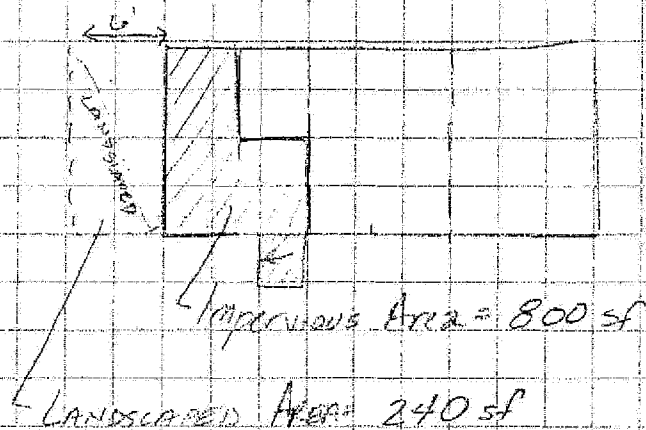
SCALE _____

Bio Retention Cell Design For Type B' Bldgs

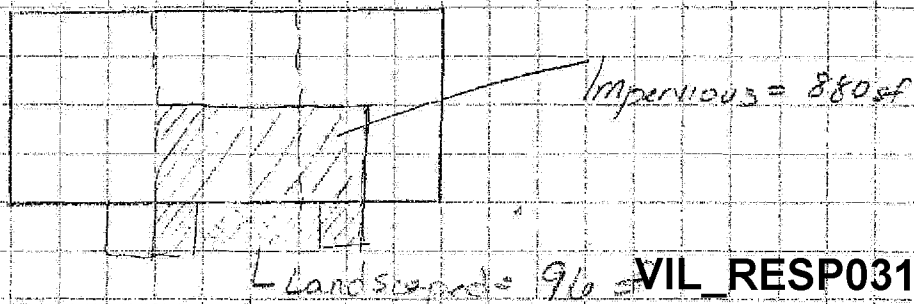
ROOF LAYOUT BLDG B



TRIBUTARY AREA FOR BIO RETENTION AREA A



TRIBUTARY AREA FOR BIO RETENTION AREA B



VIL_RESP03129

NORTHEAST CIVIL SOLUTIONS, INC.

Surveying Engineering Land Planning

53 U.S. Route 1, Scarborough, Maine 04074

Tel: 207-883-1000 • Fax: 207-883-1001

PROJECT _____

SHEET NO. 5

OF _____

CALCULATED BY _____

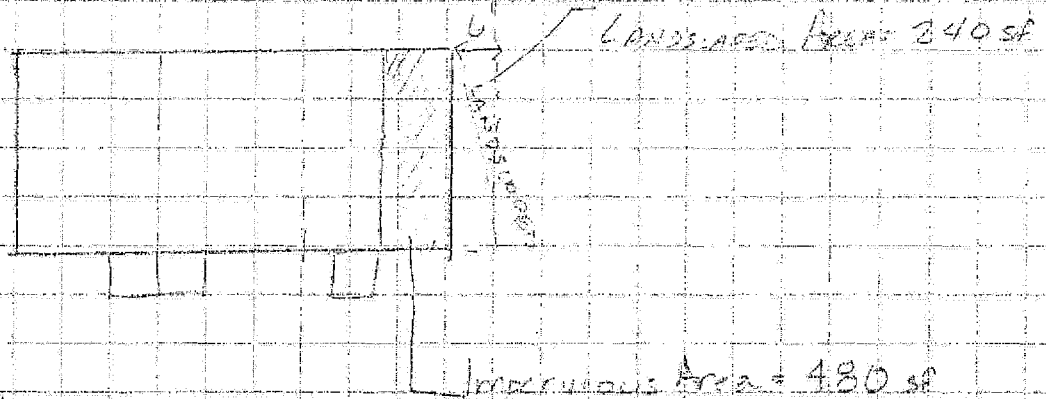
DATE _____

CHECKED BY _____

DATE _____

SCALE _____

TRIBUTARY AREA FOR BIO RETENTION AREA C



SIZE BIO RETENTION CELL FOR AREA BETWEEN (2) BUDGET TYPE B's

$$\text{TOTAL IMPERVIOUS} = \text{AREA A} + \text{AREA C} = 800 + 480 = 1280 \text{ ft}^2$$

$$\text{TOTAL LANDSCAPED AREA} = 240 + 240 = 480 \text{ ft}^2$$

$$\text{WQV}_{\text{REQD}} = (1280 \times 1" \times \frac{1}{12}) + (480 \times 0.4 \times \frac{1}{12}) = 123 \text{ ft}^3$$

If a 33' x 5' BIO RETENTION CELL WAS USED

$$\text{WQV}_{\text{PROVDED}} = (33 \times 5 \times 3' \times \frac{1}{3}) = 165 \text{ ft}^3 > 123 \text{ ft}^3 - \text{OK}$$

Check Surface Area

$$\begin{aligned} \text{Area}_{\text{reqd}} &= (0.05 \times \text{IMPERVIOUS}) + (0.02 \times \text{LANDSCAPED}) \\ &= (0.05 \times 1280) + (0.02 \times 480) \\ &= 73.6 \text{ ft}^2 \end{aligned}$$

$$\text{Area}_{\text{PROVDED}} = 33' \times 5' = 165 \text{ ft}^2 > 73.6 \text{ ft}^2 - \text{OK}$$

VIL_RESP03130

NORTHEAST CIVIL SOLUTIONS, INC.

Surveying Engineering Land Planning

153 U.S. Route 1, Scarborough, Maine 04074

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PROJECT _____

SHEET NO. 6

OF _____

CALCULATED BY _____

DATE _____

CHECKED BY _____

DATE _____

SCALE _____

Bio Retention At Base of Block Type B+ See Bio Retention Area B of Sheet 4 of this calculation
for tributary roof areaImpermeous Area = 880 sf
Landscaped Area = 96 sf

$$WQV_{REQ} = (1 \times 880 \text{ sf} \times 1.2) + (0.4 \times 96 \times 4.2) = 76.53 \text{ ft}^3$$

If a 14.5% R10 Retention System was proposed

$$WQV_{PROPOSED} = \left(14.5\% \times 3 \times \frac{1}{3} \right) = 77 \text{ ft}^3 > 76.53 \text{ ft}^3 \text{ ok}$$

VIL_RESP03131

NORTHEAST CIVIL SOLUTIONS, INC.

Surveying Engineering Land Planning

53 U.S. Route 1, Scarborough, Maine 04074

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PROJECT _____

SHEET NO. 7

OF _____

CALCULATED BY _____

DATE _____

CHECKED BY _____

DATE _____

SCALE _____

Size Bio-Retention Cell Between BLDG C & BLDG B

(See Sheet 2 & Sheet 4 Area A of this calculation for Tributary Area figures.)

$$\text{IMPERVIOUS AREA} = 800 \text{ ft}^2 + 514 \text{ ft}^2 = 1314 \text{ ft}^2$$

$$\text{LANDSCAPED AREA} = 240 \times 2 = 480 \text{ ft}^2$$

$$\text{WDV}_{\text{REQD}} = (1" \times \frac{1}{12} \times 1314) + (0.4 \times \frac{1}{12} \times 480) \\ = 125.5 \text{ ft}^3$$

If a 33' x 5' Retention Cell was used:

$$\text{WDV}_{\text{PROV}} = (33 \times 5 \times 3 \times \frac{1}{3}) = 165 \text{ ft}^3 > 125 \text{ ft}^3 \text{ -OK-}$$

Check Surface Area

$$\text{Area}_{\text{REQD}} = (0.05 \times \text{Imp}) + (0.02 \times \text{landscaped}) \\ = (0.05 \times 1314) + (0.02 \times 480) \\ = 75.3 \text{ ft}^2$$

$$\text{Area}_{\text{PROV}} = 33 \times 5 = 165 \text{ ft}^2 > 75.3 \text{ ft}^2 \text{ -OK-}$$

NORTHEAST CIVIL SOLUTIONS, INC.

Surveying Engineering Land Planning

53 U.S. Route 1, Scarborough, Maine 04074

Tel: 207-883-1000 • Fax: 207-883-1001

PROJECT _____

SHEET NO. 5

OF _____

CALCULATED BY _____

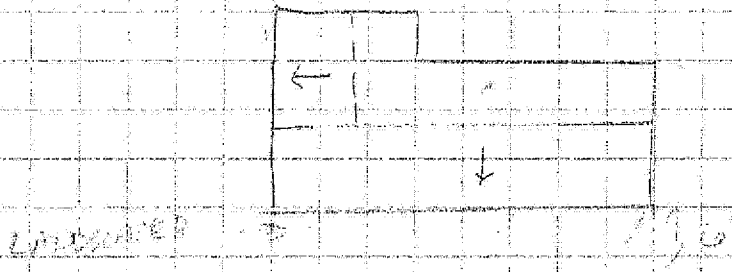
DATE _____

CHECKED BY _____

DATE _____

SCALE _____

Size Bio Retention Cell For Single Family Dwelling

IMPERVIOUS AREA FROM 1/2 OF BUDG = 1005 ft²LANDSCAPED AREA = 402 ft²

$$WDV_{REQD} = (1 \times 1/2 \times 1005) + (0.4 \times 1/2 \times 402) \\ = 97.15 \text{ ft}^3$$

If a 5' x 20' BIO CELL IS THE MIN. SIZE PROPOSE

$$WDV_{PROPOSED} = (5 \times 20 \times 3 \times 1/3) = 100 \text{ ft}^3 > 97.15 \text{ ft}^3 \text{ OK}$$

Check Surface Area =

$$A_{req} = (0.05 \times \text{Imp. Area}) + (0.02 \times \text{Landscaped}) \\ = (0.05 \times 1005) + (0.02 \times 402) \\ = 58.29 \text{ ft}^2$$

$$\text{Area Provided} = 5 \times 20 = 100 \text{ ft}^2 > 58.29 \text{ ft}^2 \text{ OK}$$

Appendix G
Ballast Calculations

NORTHEAST CIVIL SOLUTIONS, INC.
Surveying Engineering Land Planning
153 U.S. Route 1, Scarborough, Maine 04074
Tel: 207-883-1000 • Fax: 207-883-1001

PROJECT PLP
SHEET NO. _____ OF _____
CALCULATED BY SWC DATE _____
CHECKED BY _____ DATE _____
SCALE _____

CHECK IF ADDITIONAL BALLAST IS REQUIRED

PER OAK ENGINEERS TEST PIT DATA, GROUNDWATER ELEV. IS =

B113 - EXISTING GRADE = 99'

GW ENCOUNTERED AT DEPTH = 11"

GW ELEV = 88

BOTTOM OF SYSTEM = 98.5

SINCE GW IS LOWER THAN SYSTEM, NO
BALLAST REQ'D

B111 - EXISTING GRADE = 117

GROUNDWATER NOT ENCOUNTERED

B115 - EXISTING GRADE = 102

GW ENCOUNTERED AT DEPTH = 8'

GW ELEV = 94

BOTTOM OF SYSTEM = 98.5

SINCE GW IS LOWER THAN SYSTEM
NO BALLAST IS REQ'D

(REFER TO SECTION 11 FOR TEST PIT BORING LOGS)

Appendix H
Outlet Protection Calculations

NORTHEAST CIVIL SOLUTIONS, INC.

Surveying Engineering Land Planning

153 U.S. Route 1, Scarborough, Maine 04074

Tel: 207-883-1000 • Fax: 207-883-1001

PROJECT _____

SHEET NO. _____

OF _____

CALCULATED BY _____

DATE _____

CHECKED BY _____

DATE _____

SCALE _____

EROSION CONTROL MEASURES

DEVELOPE RIVER SIDE B/P ASS DURING 10 YR STORM
IS EQUIV. TO 33.93 cfs

FOR IMPROVED OILER PROTECTION TIE IN FROM THE
MAINE EROSION & SEDIMENT CONTROL DIST. (SP. 203)
DES. RIPRAP SIZE = 8" ^{1/2}

VIL_RESP03137

OUTLET PROTECTION FOR A PIPE FLOWING FULL WITH LOW TAILWATER

RIPRAP SIZE - D50 (inches)

PIPE DIAMETER

	12"	15"	18"	21"	24"	27"	30"	36"	42"	48"	54"	60"
3cfs	4											
5cfs	4											
8cfs	5	4										
10cfs	6	5	4									
12cfs	8	6	6									
15cfs	8	6	8	5								
17cfs		8	8	5								
20cfs		10	10	6	5							
25cfs		12	12	6	6							
30cfs				8	8	6						
40cfs				12	10	8	6					
50cfs				16	12	10	8	6				
60cfs				18	16	12	10	8				
70cfs					18	15	12	8				
80cfs					20	16	15	10	8			
90cfs						18	16	12	10			
100cfs						20	18	12	10			
125cfs						24	20	16	12	10		
150cfs							24	20	16	12	10	
200cfs								24	20	18	15	12

MINIMUM LENGTH OF APRON (FEET)

PIPE DIAMETER

	12"	15"	18"	21"	24"	27"	30"	36"	42"	48"	54"	60"
3cfs	8											
5cfs	8											
8cfs	11	10										
10cfs	14	12	10									
15cfs	18	16	14	12								
20cfs		18	18	16	12							
30cfs			22	20	18	16						
40cfs			26	24	24	20	18					
50cfs				26	26	24	22	18				
70cfs					30	30	28	25				
100cfs						36	36	33	27			
150cfs						42	42	42	38	33	28	
200cfs								48	45	42	37	32

From USDA Soil Conservation Service

VIL_RESP03 8

NORTHEAST CIVIL SOLUTIONS, INC.

Surveying Engineering Land Planning

153 U.S. Route 1, Scarborough, Maine 04074

Tel: 207-883-1000 • Fax: 207-883-1001

PROJECT _____

SHEET NO. _____

OF _____

CALCULATED BY _____

DATE _____

CHECKED BY _____

DATE _____

SCALE _____

RIP RAP 20" CONCRETE

OUTLET 48" 30 B/ Pals

APPROX LENGTH $L = 18'$

PER CIP CONCRETE ON SERVICE

OUTLET 48" 30 B/ Pals

APPROX WIDTH $W = 20.5'$

$W = 20.5'$

$W = 20.5'$

APPROX DEPTH $d = 10 - 10$

$10 = 2.5$

$d = 8.5'$

LAYER THICKNESS

$t = 2.25 \times D_{50}$

$D_{50} = 8"$

$= 2.25 \times \frac{8}{12}$

$t = 1.5'$

THIS OUTLET IS SHARED BY (2) 6" UNDERDRAINS

RIP RAP MEETS CR

$Q_{max} = 1.85 cfs$

$L = 8'$

$W = 8.5'$

$d = 1.5'$

$D_{50} = 4"$

$t = 0.75'$

RIP RAP MEETS CRITERIA

VIL_RESP03139

Appendix I
Maintenance Contract



Environmental Services, Inc.

17 Main Street
South Portland ME 04106
207.799.8111
207.799.0349

July 10, 2007

Denise Cameron
Project Engineer
Northeast Civil solutions
153 U.S. Route 1
Scarborough, ME 04074

Dear Denise:

Clean Harbors Environmental Services, Inc. (CHES) is pleased to submit the following quotation to provide inspection and maintenance service for the proposed storm water maintenance system associated with the Village at Little Falls project located in Windham.

Scope of Work

A CHES crew will inspect the unit every six months for the first year the system is operational until the normal sediment accumulation rate is determined. The unit will then be inspected annually, and the components of the proposed storm water management system will be maintained in accordance with the maintenance plan approved by the Maine DEP. The underground detention/soil filter will be included in the maintenance contract, and will be maintained in accordance with the Manufacturer's recommended maintenance plan.

Note: After each inspection a written report will be sent detailing the condition of the system. When service is needed it will be set up under the direction of a designated representative of the condominium association.

Pricing

Inspections

Labor, equipment, & materials.....\$150.00/unit/trip

Cleaning

Labor, equipment & materials.....\$1,300.00/unit/trip

VIL_RESP03141

Transportation and disposal

Waste water.....	\$0.20/gal	\$150.00mini/load
Sediment & debris.....	\$55.00/ton	2ton mini/load
Transportation.....	\$300.00/trip	
Note: oily contaminated water.....	\$0.50/gal	
Oily solids.....	\$1.60/gal	

Pricing is pending profile approval and does not include any applicable hazardous waste charges.

General Conditions

1. Prices firm for 30 days.
2. Terms: Net 15 days, upon approved credit.
3. Applicable sales tax and state regulatory fees are not included in quoted prices.
4. Materials subject to additional charges if they do not conform to the listed specifications.
5. All drums for disposal must be in D.O.T. approved containers and in good condition.
6. All containers must be marked with a Clean harbors profile number.
7. A variable Energy and Security recovery Fee (that fluctuates with the DOE national average diesel price), currently at 11.0% will be applied to the total invoice.

Any work performed by CHES personnel will be in strict compliance with OSHA Regulations and Clean Harbors Safety Standards. All disposals performed by CHES personnel will be done in strict compliance with state and federal regulations.

Thank you for the opportunity to continue working with you and we look forward to doing business with you in the future. If you have any questions, please feel free to contact me at (207) 799-8111 ext.347.

Sincerely,

John J. Swiger
Field Specialist
Swigerj@cleanharbors.com

Acknowledgement

Your signature below indicates your acceptance of the pricing and terms detailed in the quotation above and will be valid for a five year period from the date of signature.

Thank you for the opportunity to be of service.

Signature

Purchase order number

VIL_RESP03142

Appendix J
Sample Maintenance Log

**Village at Little Falls
BMP MAINTENANCE LOG**

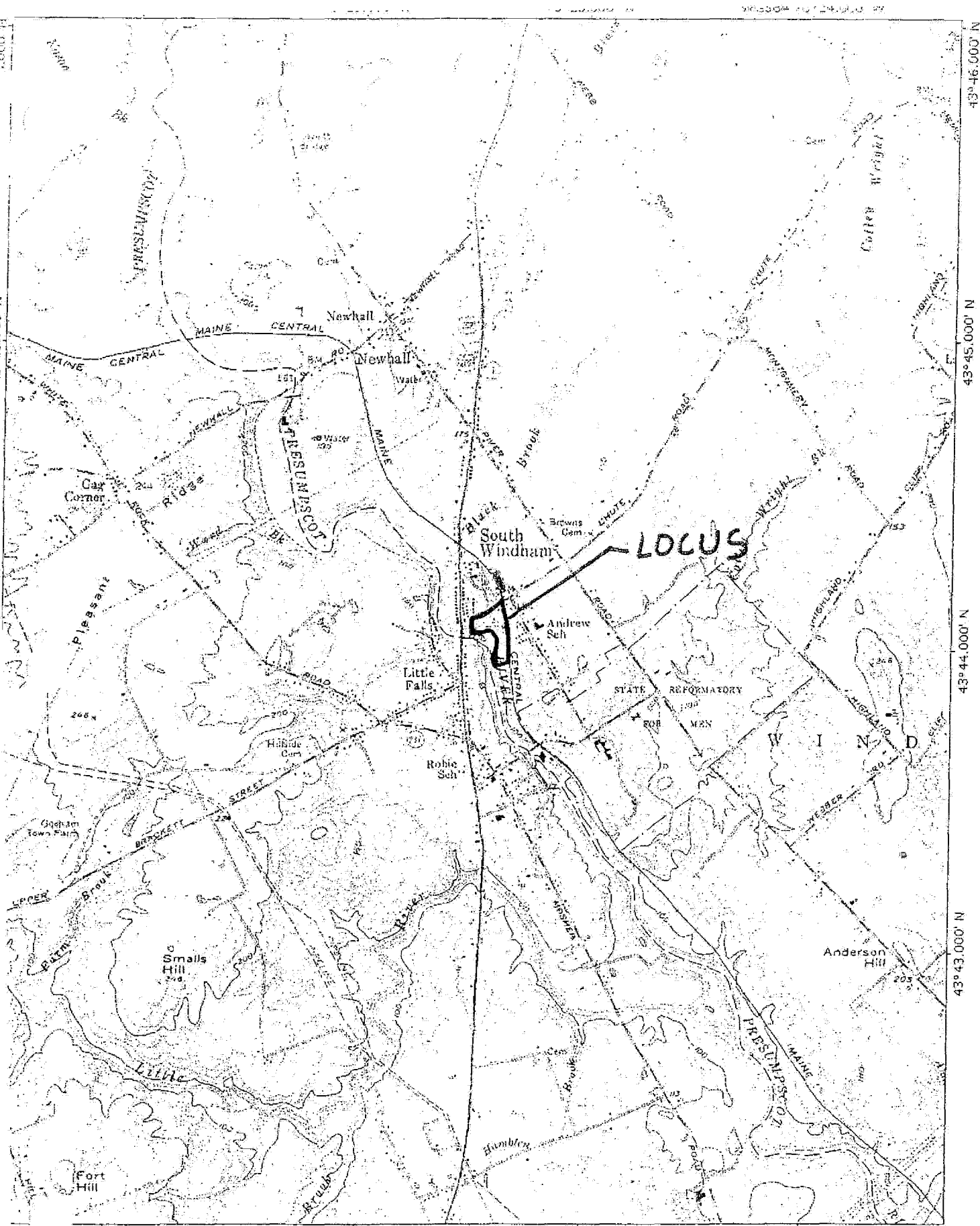
PAGE _____

BMP STRUCTURE	INSPECTOR (NAME)	WORK PERFORMED	DATE PERFORMED	COMMENTS
Roadway Sweeping				
Bio Retention System				
Underground Detention System and Subsurface Soil Filter				
Catchbasins and Drainage Pipes				
Outlet Protection				
Buffer				
Other				
Additional Comments:				

VIL_RESP03144

Appendix K

Maps



70°27.000' W

70°26.000' W

70°25.000' W

WGS84 70°24.000' W



Map created with TOPO!® ©2002 National Geographic (www.nationalgeographic.com/topo)

VIL_RESP03146

Appendix L

Condominium Association Documentation

DECLARATION OF VILLAGE AT LITTLE FALLS CONDOMINIUM

TABLE OF CONTENTS

ARTICLE 1 DECLARATION OF CONDOMINIUM PROPERTY

- 1.1 Declaration of Property.
- 1.2 Applicability.
- 1.3 Defined Terms.
- 1.4 Interpretation.

ARTICLE 2 DESCRIPTION OF PROPERTY

- 2.1. Description of the Property.
- 2.2 Location and Dimensions of Buildings and Units.
- 2.3 Recorded Plat and Plans.
- 2.4 Condominium Documents.

ARTICLE 3 DESCRIPTION OF CONDOMINIUM UNITS

- 3.1. Creation of Units.
- 3.2 Description of the Units.
- 3.3 Unit Boundaries.
- 3.4 Allocated Interests.
- 3.5 Alterations by Unit Owner.

ARTICLE 4 COMMON ELEMENTS, LIMITED COMMON ELEMENTS

- 4.1 Common Elements.
- 4.2 Limited Common Elements.
- 4.3 Common Elements to Remain Undivided.
- 4.4 Connection of Adjoining Units and Limited Common Areas.
- 4.5 Alteration of Common Elements by Declarant.

ARTICLE 5 DEVELOPMENT RIGHTS AND PHASING

- 5.1 Development Rights.
- 5.2 Phasing.
- 5.3 Assignment
- 5.4 Amendment, Waiver, Etc.

ARTICLE 6 CONDOMINIUM ASSOCIATION

- 6.1 The Association.
- 6.2 Board of Directors Powers; Declarant Control Period.
- 6.3 Bylaws.
- 6.4 Rules and Regulations.

ARTICLE 7 ASSOCIATION ASSESSMENTS ON UNIT OWNERS

- 7.1. Common Expenses and Service Charges
- 7.2 Allocation and Payment of Common Expense Assessments.
- 7.3 Service Charges.
- 7.4 Payment of and Lien for Assessments, Service Charges, Etc.

- 7.5 Liability.
- 7.6 Budget.
- 7.7 Working Capital Fund.

ARTICLE 8 MAINTENANCE RESPONSIBILITIES AND USE RESTRICTIONS

- 8.1 General Maintenance Responsibilities
- 8.2 Maintenance of Common Elements.
- 8.3 Maintenance of Limited Common Elements.
- 8.4 Maintenance of Unit.
- 8.5 Liability of Owner.
- 8.6 Use and Occupancy Restrictions on Units.
- 8.7 Use of Common Elements.
- 8.8 Leasing.
- 8.9 Liability for Assessments, Etc.
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DECLARATION OF VILLAGE AT LITTLE FALLS CONDOMINIUM

ARTICLE 1 DECLARATION OF CONDOMINIUM PROPERTY

THIS DECLARATION OF VILLAGE AT LITTLE FALLS CONDOMINIUM ("Declaration") is executed by HRC-VILLAGE AT LITTLE FALLS, LLC, a Maine limited liability company with a mailing address of 2 Market Street, Portland, Maine 04101 ("Declarant"), pursuant to the Maine Condominium Act, chapter 31 of Title 33 of the Maine Revised Statutes of 1964, as amended ("Condominium Act").

§1.1 Declaration of Property. The Declarant as the owner in fee simple of the land located on Depot Street in the Town of Windham, County of Cumberland and State of Maine described in Exhibit A, the buildings and improvements now or hereafter located thereon and subject to and together with all easements, rights, privileges and appurtenances thereto (collectively the "Property"), HEREBY SUBMITS the Property to the Condominium Act in accordance with this Declaration, and establishes a condominium as defined in Section 1601-103(7) of the Condominium Act ("Condominium") known as Village at Little Falls Condominium. The name of the Unit Owners' association is the Village at Little Falls Association, a Maine nonprofit corporation (the "Association"). Initially, the Condominium consists of the Property and the initial unit known as Unit # ___, [to be determined].

As set forth in this Declaration, the Declarant reserves various Development Rights, Special Declarant Rights and easements, including without limitation the right to physically construct and legally create a total of up to eighty five (85) Condominium Units with associated Common Elements.

§1.2 Applicability. This Declaration shall govern the Property. All present and future owners, occupants and tenants, their guests, licensees, invitees, employees, agents, and any other person entering on the Property shall be subject to this Declaration, the Bylaws of the Association and to such Rules and Regulations of the Association, all of which shall be deemed to be covenants running with the land, and shall bind any person having at any time any interest in or entering upon the Property.

§1.3 Defined Terms. Capitalized terms not otherwise defined in this Declaration or on the Plat and Plans shall have the meanings specified in the Condominium Act.

§1.4 Interpretation. In the event of any conflict or discrepancy between this Declaration, the Bylaws, the Rules and Regulations, and the Plat and Plans, the provisions of this Declaration shall govern.

ARTICLE 2 DESCRIPTION OF PROPERTY

§2.1 Description of the Property. A legal description of the Property included in the Condominium is set forth in Exhibit A. The location and dimensions of the Property initially included in the Condominium are depicted on the Condominium Plat entitled "Condominium Plat of Village at Little Falls" dated _____, 2007 as amended through

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_____, 2006 by _____ recorded in said Registry of Deeds in Plan Book _____, Page _____ (the "Plat"), a reduced copy of which is attached hereto as Exhibit B.

§2.2 Location and Dimensions of Buildings and Units. The term "Building" means any building erected or to be erected on the Property containing one or more Units, as well as other improvements comprising a part of a building or intended to be used for purposes incidental to the use of a building. The proposed location and dimensions of the Buildings and other improvements which may be erected on the Property, including Common Elements, are shown on the Plat as depicted on Exhibit B.

The proposed location and dimensions of initial and proposed Unit together with its appurtenant Limited Common Elements are depicted on the Floor Plans entitled "Village at Little Falls" dated _____, 2006 by _____ and recorded in said Registry of Deeds in Plan Book _____, Page _____ (the "Plans"), reduced copies of which are attached hereto as Exhibit C. The proposed location and dimensions of each Building and Unit are subject to change by the Declarant until such time as each Unit is legally created, and such improvements need not be built or may be built with configurations and locations different than those shown on the Plat and Plans, as further appears in Article 5 below.

§2.3 Recorded Plat and Plans. The original Plat and Plans and any amendments thereto shall be recorded with this Declaration in the Cumberland County Registry of Deeds.

§2.4 Condominium Documents. "Condominium Documents" means this Declaration, the Plat, the Plans, the Bylaws of the Association, and the Rules and Regulations adopted by the Board of Directors, and any amendments to any of the foregoing adopted from time to time.

ARTICLE 3 CONDOMINIUM UNITS

§3.1 Creation of Subsequent Units. Initially Unit # _____ is created under this Declaration. The Declarant has the right to create up to eighty-four (84) additional Units. For each Unit subsequently created pursuant to this Declaration, its Allocated Interests shall be set forth in an amendment to Exhibit D, and a description of such Unit including each Unit's identifying number, the locations and dimensions of the vertical boundaries and horizontal boundaries of each Unit, the Common Elements to which the Unit has direct access, and any other information necessary to identify the Unit shall be shown on the Plat and Plans.

§3.2 Description of the Units. "Unit" means a part of the Property designated for separate ownership or occupancy which has a direct exit to Limited Common Elements and Common Elements. For each Unit created from time to time pursuant to this Declaration, the identification number and approximate area are shown on the Plat and Plans of the Property as amended from time to time. Any Unit's internal room configuration shown on the Plans is illustrative only, and is not binding on an owner except that the structural support of the Building must be preserved.

Each Unit includes the following items:

- (a) All interior partitions (excepting those portions thereof which are load-bearing), interior doors and interior stairways located wholly within the Unit;
- (b) Finish flooring, floor coverings, carpeting and the like, and finish wall and ceiling coverings (including paint, wallpaper, furring, gypsum board, moldings, and any other materials constituting any part of the finished surfaces thereof);
- (c) Windows, exterior doors and garage doors providing access to the Common Elements including their locks, hardware, tracks, and glass, but excluding their frames, thresholds and sills;
- (d) Plumbing, kitchen and bathroom pipes, lines and fixtures, the heating and ventilating equipment and vents, kitchen appliances, water heaters, air conditioning systems if any, and components thereof serving only a single Unit, if any, even if located outside of a Unit's boundaries;
- (e) Electrical wiring, equipment outlets and lighting devices from the point where the feed wire enters the Unit's circuit breaker distribution box inwards, and portions of electric, water and utility lines, pipes, outside lights, doorbells, conduits, vents, flues, fans, and equipment serving only that Unit, even if located outside of a Unit's general boundaries; and,
- (f) The interior of the garage.

A Unit generally does not include the exterior walls, the roofs, rafters, attics and foundations, slabs, land, and any pipes, wires, conduits, flues, ducts, wires, pipes, or other utility lines running through a Unit which serve more than one Unit or which serve the Common Elements or which serve another Unit.

Each Unit and the Common Elements shall have an easement for lateral and subjacent support from every other Unit and the Common Elements, and shall have the easement for encroachments established under Section 1602-114 of the Condominium Act. In addition, each Unit Owner has an unrestricted, perpetual right of ingress and egress to his or her Unit across the Common Elements, which automatically transfers with a transfer of title to the Unit. Any conveyance, encumbrance, judicial sale, or other transfer (whether voluntary or involuntary) of an interest in the Common Elements shall be void unless the Unit to which that Common Element interest is allocated is also transferred.

§3.3 Unit Boundaries. The boundaries of each Unit subsequently created under this Declaration are shown on the Plat and Plans, and shall consist of:

(a) *Horizontal Boundary:* The upper and lower boundaries of each Unit are generally the following boundaries extended to an intersection with the vertical (perimeter) boundaries:

1. *Upper Boundary:* The planes at the lower surfaces of the floor joists of the attic or Unit located above a Unit, including the upper (outside) side of the gypsum board of the ceiling and any other materials constituting any part of the finished surfaces thereof, if any, extending to the intersection with the vertical boundaries.

2. *Lower Boundary*: The horizontal plane at the upper surface of the undecorated surface of the concrete floor slabs extending to the intersection with the vertical boundaries.

(b) *Vertical Boundaries*: The vertical boundaries of each Unit shall be the vertical planes at the stud line at the exterior or outer-most surface of the gypsum-board, sheetrock, or other wall materials forming its exterior or common walls, all extended to the intersections with each other and with the horizontal boundaries.

(c) *Interior Finishes*. The Unit shall include all wallboard, plasterboard, plaster, paneling, tiles, wallpaper, paint, wallpaper, finished flooring and any other materials constituting any part of the finished surfaces thereon located within the boundaries of the Unit.

(d) *Interior Space*. All other spaces, interior partitions and other fixtures and improvements within the boundaries of a Unit are a part of the Unit.

§3.4 *Allocated Interests*. The term "Allocated Interests" means the Common Element Interest, the Common Expense Liability and the voting rights in the Association allocated to each Unit pursuant to this Declaration. The term "Common Element Interest" means the percentage of undivided interest in the Common Elements appurtenant to each Unit. The term "Common Expense Liability" means the allocation to each Unit of the respective liability for Common Expenses. Generally the Common Expense Liability allocated to a Unit is a percentage equal to the Common Element Interest appurtenant to such Unit. The Allocated Interests of each Unit shall be set forth in Exhibit D.

The percentage of each Unit's Common Element Interest and Common Expense Liability is allocated by calculating (i) the sum of the number of square feet of heated, above grade living space in the Unit plus the square feet of the portions of the Common Elements abutting such space extending out to the exterior sheathing or for abutting units, the centerline of the wall separating the units relative to (ii) the total square feet of such for all Units which have then been created in the Condominium, (iii) subject to rounding in order to permit ease of administration, provided however that (iv) the percentage stated in Exhibit D (as it may be amended) shall prevail in any event. Open loft areas, below grade areas, basement and garage areas shall not be counted in calculating such percentages.

Each Unit shall each have one vote in the Association on a formula of one vote per Unit to permit equality among Units.

The Association shall have the express power to separately assess "Service Charges" against a Unit and the Owner thereof for services rendered by the Association to or for the benefit of that Unit as set forth in Section 9.6 below.

§3.5 *Alterations by Unit Owner*. Subject to this Declaration, the Bylaws and the Rules and Regulations of the Association as amended from time to time, a Unit Owner may make nonstructural improvements and alterations within the interior of the Unit. However, no Unit Owner may make any improvements or alterations or do any work whatsoever which would impair the structural integrity or mechanical systems or the walls separating units or life safety

systems of a Building, lessen the support of any portion of the Condominium, or jeopardize the soundness or safety of the Property.

No Unit Owner shall alter any of the Common Elements or paint or otherwise change the appearance of the Common Elements (including without limitation the Limited Common Elements) or paint or otherwise change the exterior appearance of the Unit (including, but not limited to, the exterior surfaces of doors or windows leading to a Common Element or a Limited Common Element) or any other portion of the Condominium, without the prior written approval of the Board of Directors of the Association.

ARTICLE 4 COMMON ELEMENTS, LIMITED COMMON ELEMENTS

§4.1 Common Elements. The term "Common Elements" means the entire Property other than the Units, and includes:

- i. The land, together with the benefit of and subject to all the accompanying rights and easements described in Exhibit A, and all landscaping, vegetation, storm water facilities, and drives;
- ii. The foundations, concrete floor slab, roof, exterior walls, porches, decks, outside steps, and all structural and load bearing portions of the buildings;
- iii. The utility lines, pipes, wires, electrical and transmission wires and conduits, any life safety systems, distribution pipes, storm water systems, and water and sewer utility lines which serve more than one Unit or the Common Elements (excepting lines and equipment owned by public and municipal utilities or which form portions of the Unit as defined above); and
- iv. All other parts of the property necessary or convenient to its existence, maintenance and safety or normally in common use, except as otherwise expressly provided in this Declaration.

§4.2 Limited Common Elements. The term "Limited Common Elements" means those portions of the Common Elements where the exclusive use is reserved to one or more, but fewer than all, of the Units in accordance with this Declaration. Limited Common Elements, consist of the following:

- i. For each Unit, an exterior driveway, if any, as shown and assigned as Limited Common Elements on the Plat and/or Plans;
- ii. The exterior porch and deck areas, if any, shown and assigned as Limited Common Elements on the Plans;
- iii. Any door steps, stoops, thresholds, doors and windows and their frames and sills and any other fixture designed to serve a single Unit but located outside its boundary servicing a Unit;

- iv. The attic space, if any, above a Unit and for Units located in building which do not have Units located above other Units, the land and concrete slab and foundation below a Unit; and
- v. the portions of the Property shown on the Plat and Plans or as described as Limited Common Elements pursuant to Section 1602-102(2) and (4) of the Condominium Act.

The allocation of Limited Common Elements cannot be altered except in compliance with the Condominium Act, and with the written consent of the Owners and Mortgagees of record of the Units affected by the reallocation of Limited Common Elements.

§4.3 Common Elements to Remain Undivided. The Common Element Interest of a Unit shall be inseparable from each Unit, and any conveyance, lease, devise or other disposition and any mortgage or other encumbrance of any Unit shall include the Common Element Interest, whether or not expressly referred to in the instrument making such transfer. The Common Elements shall remain undivided and no action for partition or division of any part shall be permitted, unless otherwise provided by law and permitted by this Declaration.

§4.4 Connection of Units and Limited Common Areas. If the record owners of the subject Unit(s) affirmatively elect, with the written approval of the Board of Directors of the association based on each owner's compliance with the standards set forth hereinafter, all to be evidenced by a recorded instrument duly executed and acknowledged, that portion of the Common Elements located between a Unit and an adjoining Limited Common Element (with the consent of any other Units sharing the same), may be thereby subjected to an easement in favor of each such Unit respectively running to the midpoint of the space between each Unit or to the Limited Common Element for the removal and alteration of any intervening partition and the creation of apertures therein for passage back and forth between the two Units or to the Limited Common Element, and for the installation of stairs, doors, windows and frames appurtenant thereto. The owners shall be strictly liable for any resulting damage. At all times after such election each Unit Owner shall preserve and maintain the structural integrity and architectural style, the mechanical and utility systems, and the support of all portions of the Property; and shall strictly comply with all fire, building code and other governmental laws, ordinances and requirements. Any such Unit Owner or his respective heirs, mortgagees or assigns, may at any time revoke such election by instrument duly executed and acknowledged served on the other such owners and duly recorded, and thereafter may seal up passageways and/or remove the stairs, doors and their frames, and/or install a permanent wall, floor ceiling or other partitions, at all times preserving the structural integrity, the mechanical and utility systems and support of all portions of the Property. Nothing contained herein shall be deemed to merge or otherwise affect the separate identity, configuration or the boundaries of said Units.

§4.5 Alteration of Common Elements by the Declarant. Until all Units have been sold and the Declarant's obligations under purchase and sale agreements for all Units have been satisfied, the Declarant reserves the right to modify, alter, repair or improve portions of the Common Elements, including without limitation, any equipment, fixtures and appurtenances, and further reserves an easement over the Common Elements in order to discharge its obligations and to exercise any Declarant Rights, whether arising hereunder or under the Condominium Act.

ARTICLE 5
DECLARANT'S RIGHTS AND PHASING

§5.1 Development Rights. The Declarant reserves the rights:

(a) Until the construction, marketing and sale of all Units is completed, including any future Units which may be created hereunder, to locate in the Common Elements and Units of the Property, even though not depicted on the Plat and Plans, and grant and reserve easements and rights-of-way for the installation, maintenance, repair, replacement and inspection of public utility lines, wires, pipes, conduits and facilities servicing or burdening the Property including, but not limited to, water, electric, telephone, cable television, fuel, sewer, and surface and subsurface drainage, provided however that no such easement shall be effective until of record, that no such easements may be granted through Units sold by Declarant to third party who is not a successor Declarant and that the Common Elements shall be promptly restored upon installation and repair;

(b) Until the construction, marketing and sale of all Units is completed, including any future Units which may be created hereunder, to connect with and make use of utility lines, wires, pipes and conduits located on the Property for construction and sales purposes, provided that the Declarant shall be responsible for the cost of services so used;

(c) Until the construction, marketing and sale of all Units is completed, including any future Units which may be created hereunder, to use the Common Elements for ingress and egress, for the construction, reconstruction, maintenance, repair, renovation, replacement or correction of the Units or Common Elements including without limitation the movement and temporary storage of construction materials and equipment, the right of vehicular and pedestrian access, the right to park motor vehicles, and for the installation of signs and lighting for sales and promotional purposes;

(d) Until the construction, marketing and sale of all Units is completed, including any future Units which may be created hereunder, to operate and relocate construction, sales, leasing and management offices; permit prospective tenants, purchasers, lenders, appraisers, and others to visit the offices and use the Common Elements and use unsold Units for construction, sales, leasing and display purposes;

(e) Appoint and remove members of the Board of Directors and Officers of the Association in accordance with Section 6.2 of this Declaration;

(f) Until the construction, marketing and sale of all Units is completed (including any future Units which may be created hereunder), to approve of the creation of easements between a Unit and an adjoining limited common element in accordance with Section 4.4 of the Declaration in accordance with the standards set forth therein;

(g) Until the expiration of any applicable warranty established by law or agreement, the Declarant, its contractors, agents and employees shall have the right of entry into a Unit to perform warranty-related work, whether for the benefit of than Unit or any other Unit;

(h) Until the construction, marketing and sale of all Units is completed, including any future Units which may be created hereunder, to grant easements for public utilities running over, through or under the Common Elements

(i) Those rights established under Sections 3.6 and 4.5 of the Declaration;

(j) Those rights established under the Condominium Act.

The exercise of Development Rights shall be subject to the following restriction:

- i) No changes shall be made to the Contract Zone dated June 1, 2005 and recorded in the Cumberland County Registry of Deeds in Book 227112, Page 102 except in accordance with its terms, or in the approvals from the Town of Windham Planning Board, reference being made to the Plan recorded in the Cumberland County Registry of Deeds in Plan Book _____, Page _____ unless any applicable approval is received pursuant to the Town of Windham's Land Use Ordinances to the extent applicable;
- ii) No changes shall be made the Maine Department of Environmental Protection's approval dated _____, 2007 unless any applicable approval is received.

§ 5.2 PHASING. Developer reserves the rights but not the obligation until seven (7) years from the date of the recording of this Declaration:

A. To create on the Property a total of up to eighty five (85) Units, Common Elements and Limited Common Elements appurtenant to such Units on the Property as described in the attached Exhibit A, all pursuant to Section 1602-110 of the Condominium Act. Said conversion creating additional Units and Limited Common Elements may be composed of up to six (6) buildings. The projected location and approximate dimensions of the Units and Limited Common Elements for said buildings are shown on the Plat and Plans. Said additional buildings, Units and Limited Common Elements need not be built with the configurations or in the locations as shown on the Plat, and the DECLARANT EXPRESSLY RESERVES THE RIGHT TO VARY SUCH BUILDINGS, UNITS, LIMITED COMMON ELEMENTS AND THEIR LOCATIONS in its discretion, subject to the restrictions set forth in Section 5.1 above. Upon the addition of Units, which may occur in such stages and in such order as the Declarant determines, they shall be fully integrated into the Condominium as if this Declaration had been originally executed and recorded containing the additional Building Phase(s) and the Allocated Interests of the Units shall be reallocated in accordance with the formulas set forth in this Declaration and as more particularly set forth in the amendment adding said Building Phase(s).

All such future Units, Common Elements and Limited Common Elements *shall be* consistent with the initial Units in terms of the quality of construction, general architectural style and principal materials, provided that the Declarant may substitute construction materials and technique of equal or better quality and, upon the addition thereof to the Condominium, must be substantially completed. All restrictions in or created by authority of this Declaration affecting the use, quality or alienation of Units *shall apply* to such Units including, without limitation, the restriction to residential use set forth herein. Declarant need not add said buildings or and said Limited Common Elements to the Condominium and hence said buildings, Units, Common

Elements and Limited Common Elements NEED NOT BE BUILT. All improvements within a future Building Phase must be substantially completed upon the addition to the Condominium. The Declarant must exercise its rights hereunder within seven (7) years of the recording of this Declaration.

B. Upon the addition of such Units to the Condominium, the Allocated Interests of all Units shall be reallocated in accordance with Section 3.4 of this Declaration and Exhibit D shall be amended accordingly.

C. To exercise any rights under this Section, the Declarant shall prepare, execute and record an amendment to the Declaration pursuant to the Condominium Act, which amendment may include a Plat and Plans as required by the Condominium Act to the extent not previously recorded. Said amendment shall become effective upon recording without the consent of any other person.

§5.3 Assignment. All or any part of the rights, powers or reservations of Declarant contained in this Declaration may be assigned by Declarant to any person or entity which will assume the duties and obligations of Declarant related to the rights, powers or reservations assigned. Upon the recording of an assignment of such rights, powers or reservations pursuant to which the assignee assumes the duties and obligations of Declarant related thereto, the assignee shall become a successor Declarant as to such rights, powers or reservations assigned and shall have the same rights and powers and be subject to the same duties and obligations as are given to and assumed by Declarant herein, and Declarant shall be relieved from all liability with respect to the rights, powers, reservations, duties and obligations hereunder which are assumed by the assignee.

§5.4 Amendment, Waiver, Etc.

ARTICLE 5 and Sections 4.4 and 4.5 shall not be amended or waived without the consent of the Declarant duly recorded in said Registry of Deeds.

The rights and benefits of ARTICLE 5 and all other rights of Declarant set forth in this Declaration, the Bylaws or otherwise, as amended from time to time, may be transferred in whole or part by recorded instrument specifically referring to this Section and executed by Declarant and its successor or assignee.

The Declarant shall have the right to waive the Development and Special Declarant Rights reserved hereunder in whole or part by an written instrument provided that such waiver shall only be effective upon recording in said Registry of Deeds and such waiver shall be subject to the limitations of Section 1603-103(d) of the Act regarding Declarant Control of the Association.

ARTICLE 6 CONDOMINIUM ASSOCIATION

§6.1 The Association. The term "Association" means the association of the Unit Owners organized pursuant to Section 1603-101 of the Condominium Act as a nonprofit corporation under the Maine Non Profit Corporation Act. The membership of the Association at all times shall consist exclusively of all Unit Owners, or in the event of a termination of the Condominium as provided in the Condominium Act, of all former Unit Owners entitled to distributions of proceeds, or their heirs, successors or assigns. Persons having an interest in a Unit solely as security for an obligation shall not be considered members.

Each Unit Owner shall automatically become a member of the Association, which membership shall continue as long as she or he continues as a Unit Owner, and upon the termination of the interest in the Condominium, his or her membership and any interest in the assets of the Association shall be automatically transferred and inure to the next Unit Owner or Owners succeeding him in interest.

The Association shall have all the powers granted pursuant to its Bylaws, the Condominium Act and the Maine Non Profit Corporation Act.

§6.2 Board of Directors Powers; Declarant Control Period. Except as otherwise provided in Section 1603-103(b) of the Condominium Act, the Board of Directors may act on behalf of the Association and shall have all of the powers necessary or appropriate for the administration of Association.

During the Declarant Control Period, the Board of Directors shall be composed of three (3) natural persons. The term "Declarant Control Period" means the period which extends from the date of the recording of this Declaration until the earlier of (a) seven (7) years following the conveyance of the first Unit to a Purchaser or (b) sixty (60) days after the conveyance of seventy-five percent (75%) of the Units, other than a conveyance to a successor Declarant. The Declarant shall have the right during the Declarant Control Period to appoint, remove and replace from time to time any and all members of the Board of Directors, and officers of the Association, without the necessity of obtaining resignations. The directors appointed by the Declarant need not be Unit Owners.

Following the expiration of Declarant Control Period, the affairs of the Association shall be governed by a Board of Directors composed of no less than five (5) and no more than eleven (11) natural persons, the exact number of which shall be established by the Bylaws of the Association but which shall not exceed the number of Units which have been created hereunder. Each Unit shall vote as a class for the election of one director. A majority of the members at the Board of Directors shall be Unit Owners or spouses of Unit Owners or in the case of a Unit Owner which is a corporation, limited liability company, partnership, trust or estate or other legal entity, a designated agent thereof.

The transition from Declarant-appointed members of the Board of Directors to the Unit Owners generally shall occur no later than the earlier of (a) sixty (60) days after the conveyance of 75% of the Units to purchasers other than a successor Declarant, or (b) seven (7) years following conveyance of the first Unit to a Purchaser, or (c) at such earlier date as the Declarant in its sole

discretion shall specify. Prior to the expiration of the Declarant Control Period, a transition meeting of the Association and a transition election shall be held at which all of the members of the Board of Directors and officers of the Association appointed by the Declarant shall resign, and the Unit Owners, including the Declarant if the Declarant owns any Units, shall thereupon elect a Board of Directors to act in the place and stead of those resigning.

By written notice duly recorded in said Registry of Deeds specifically referring to this Section, the Declarant may voluntarily surrender the right to appoint and remove officers and members of the Board of Directors prior to the termination of the Declarant Control Period, but in that event the Declarant may require, for the duration of the Declarant Control Period that specified actions of the Association or Board of Directors, as described in a recorded instrument executed by the Declarant, be approved by the Declarant before such action can become effective.

§6.3 Bylaws. The initial bylaws of the Association are attached hereto as Exhibit E.

§6.4 Rules and Regulations. The Board of Directors shall have the power from time to time to adopt, amend and enforce Rules and Regulations relative to the operation, use and occupancy of the Units and the Common Elements, consistent with the provisions of this Declaration, Bylaws and the Condominium Act including, but not limited to, the appointment of such committees and the enactment and enforcement of such enforcement procedures and penalties for violations as the Board of Directors shall deem appropriate. Any such Rules and Regulations shall be adopted or amended, by means of appropriate resolutions duly approved by the Board of Directors. Notice of such Rules and Regulations and any amendment thereto shall be sent to each Owner or occupant of a Unit promptly after the adoption thereof, and shall bind all Owners, their heirs and assigns, any all tenants, invitees, guests and other persons entering upon the Property.

ARTICLE 7 COMMON CHARGES AND ASSESSMENTS

§7.1 Common Expenses and Service Charges. The term "Common Expenses" include, but are not limited to, such costs and expenses established by the Condominium Act, by this Declaration, by the Bylaws, or by the Board of Directors in connection with the administration, operation, maintenance and repair of the Condominium and the Property and the rendering to Unit Owners of all related services.

The term "Limited Common Expenses" mean the Common Expenses associated with the maintenance, repair or replacement of a Limited Common Element, which may be assessed against the Unit(s) to which the appurtenant Limited Common Element is assigned in proportion to the relative Common Expense Liabilities of such Unit(s), all as the Board of Directors may periodically establish and determine. If all Units have similar Limited Common Elements, then the Board of Directors may determine that all Units shall pay such expenses in accordance with their Common Expense Liabilities.

The term "Service Charges" shall mean charges for services benefiting fewer than all the Units, which are assessed exclusively against the Unit or Units benefited in accordance with the

use of such services as permitted by Section 1503-115(c) of the Condominium Act and the Bylaws.

All expenses for the administration, operation, maintenance and repair of the condominium and the Property shall be borne by the Unit Owners, by means of assessments as set forth herein.

§7.2 Allocation and Payment of Assessments of Common Expenses. The total amount of common expenses shall be assessed to the Units as follows.

(a) The Common Expenses that are not otherwise assessed as Limited Common Expenses or Service Charges shall be assessed against all the Units in proportion to the relative Common Expense Liabilities as set forth herein.

(b) If the Board of Directors determine that a Limited Common Expense benefits more than a single Unit in a manner which is not uniform among all Units, then such Limited Common Expense shall be assessed solely against the benefited Unit in proportion to the relative Common Expense liabilities of such Units as between themselves, all as the Board of Directors may periodically determine. If a Limited Common Expense only benefits a single Unit, that Limited Common Expense may be assessed solely against the Unit benefited, as the Board of Directors shall determine.

(c) For electricity, telephone and cable television services if any, each Unit Owner shall promptly pay the bills for such services consumed or used in his or her Unit. Any electricity serving the Common Elements and the expenses of the maintenance, repair and replacement of the water and system shall be assessed to each Unit as a Common Expense, subject of the right of the Association to submeter and then separately charge for water and sewer services supplied to the Units as Service Charges.

(d) Each Unit is subject to a lien in favor of the Association for the unpaid Common Expenses, Limited Common Expenses, Service Charges and penalties, fines, interest and costs of collection including reasonable attorneys' fees, all as provided in the Condominium Act, the Declaration and the Bylaws.

(e) In any event no later than 60 days after the first Unit is conveyed, all Unit owners including the Declarant shall commence paying monthly common charges to the Association for all Units which have been legally created and submitted to the Condominium.

§7.3 Service Charges. The Association shall have the express power to separately assess a Unit and the owner thereof for a "Service Charge" for services rendered to that Unit. Such Service Charge assessments shall constitute a lien on the Unit with the same status as a lien for Common Expense liability assessments under the Condominium Act, this Declaration and Bylaws, which lien for service charges may be foreclosed in like manner as a mortgage on real estate. The recordation of this Declaration constitutes record notice of the lien. Service Charges shall include without limitation:

(i) If a Unit Owner, members of his family, guests or tenants requests the Association or its agent to perform repair and maintenance work on his Unit, or damages the Common

Elements or safety systems or fails to perform maintenance and repair work required, the expense thereof as determined by the Board of Directors or its designee may be assessed as a Service Charge.

(ii) Fees, if any, which may be established by the Board of Directors for the use and maintenance of water, sewer and/or other utility services and equipment, if not separately metered and billed by the public utility supplier, may be measured separately by such methods and systems established by the Board of Directors in their discretion. The expense of any public utility charges for water and sewer services and of associated equipment maintenance and repair and reasonable reserve allowances, if not separately metered and billed by the public utility supplier, may also be calculated by the Board of Directors in their discretion and assessed monthly as a service charge to each Unit. For budgeting and working capital purposes, the Board of Directors may charge Unit Owners monthly in advance for such expenses based on its reasonable estimate thereof, subject, however, to such periodic reconciliation as the Board in its discretion may deem appropriate based on the measuring system adopted by the Board. At the election of the Board of Directors, the expense of capital improvements, major repairs or renovations to the water and sewer supply systems may be assessed either as a common expense or as a service charge. The expense of water and sewer services for the Common Elements may be assessed as a common expense or as a service charge at the election of the Board of Directors.

(iii) Insurance premiums for permanent improvements to Units installed by Unit Owners and insured by the request of the Unit Owner with the Association's hazard insurance carrier.

§7.4 Payment of and Lien for Assessments, Service Charges, Fines, Etc.

a) Each Unit Owner shall pay to the Association or its designee the following amounts: (i) on the first day of each month or on such other date that the Board of Directors may determine, one-twelfth (1/12th) of the common charges for Common Expenses including Limited Common Expenses, and Service Charges and revised Common Expenses including revised Limited Common Expenses, assessed against his Unit; (ii) all special assessments and any other sums duly levied against the Unit pursuant to this Declaration, the Bylaws, the Rules and Regulations or the Condominium Act which are assessed against Unit Owners; and (iii) interest at the rate of 18% per annum, (iv) fines, penalties, fees, and late charges as may be established by the Board of Directors pursuant to the Rules and Regulations, and (v) legal fees and other costs of collection, foreclosure and enforcement thereof.

If for any reason the Association shall revise its annual budget and as a result the Common Expenses or Limited Common Expenses are increased, then commencing on the next day assessments are due each Unit Owner shall pay to the Association or its authorized representative such revised annual Common Expenses, including Limited Common Expenses, assessed against his Unit.

(b) The total annual assessment levied against each Unit for Common Expenses, Limited Common Expenses, Service Charges, any special assessment, other sums duly levied against the Unit pursuant to this Declaration, the Bylaws, the Rules and Regulations, or the Act, all interest and late charges, all legal fees and other costs of collection thereof, and all fines, penalties and fees as provided in this Declaration or the Bylaws: (i) shall constitute the personal liability of the

Owner of the Unit so assessed; and (i) shall, until fully paid, constitute a lien against the Unit in favor of the Association as provided in Section 1603-116 of the Condominium Act.

Such lien is prior to all other liens and encumbrances on a Unit except (a) liens and encumbrances recorded before the recordation of this Declaration, (b) a first priority mortgage recorded before or after the date on which the assessment sought to be enforced becomes delinquent, and (c) statutory liens for real estate taxes and other governmental assessments or charges against the Units; provided, however, that such lien is not subject to the provisions of 14 M.R.S.A. Section 4651 and 18-A M.R.S.A. Section 2-201, et seq., as they or their equivalents may be amended or modified from time to time.

If any assessment is payable in installments, upon a default by such Unit Owner in the timely payment of any two (2) installments in any fiscal year, the maturity of the remaining total of the unpaid installments may be accelerated at the option of the Board of Directors, and the entire balance of the assessment may be declared due and payable in full.

(c) The lien for assessments described in subparagraph (b) may be enforced and foreclosed by the Association in like manner as a mortgage on real estate as provided in the Condominium Act, or by any other means presently or hereafter provided by law or in equity. A suit to recover a money judgment for unpaid assessments, interest, fines, penalties, and costs of collection may be maintained against the Unit Owner personally without foreclosing or waiving the lien securing such assessments, and a foreclosure may be maintained notwithstanding the pendency of any suit to recover a money judgment.

(d) Upon a default in the payment of any amount due the Association or a violation of any provision of the Condominium Act, this Declaration, the Bylaws, or the Rules and Regulations of the Association, which violation continues after reasonable notice from the Association to the Unit Owner, then that Unit and its occupants may be excluded from the use and enjoyment of any and all of the Common Elements not essential to access to the Unit, in addition to all other remedies available to the Board of Directors.

§7.5 Liability. Multiple owners of a Unit shall each be jointly and severally liable for all Common Expenses, Limited Common Expenses, special assessments, Service Charges, interest, fees, penalties and costs of collection. A grantee receiving a conveyance of a Unit shall not be prevented from exercising any right to recover from the grantor such amounts paid for those assessments, common charges, etc. arising prior to the conveyance. A grantee or proposed purchaser for a Unit under a purchase and sale contract may obtain a statement from the Association setting forth the amount of unpaid common charges, assessments and service charges, late fees, interest and costs of collection against the Unit and such other items required by the Condominium Act, upon payment of such fee as may be established from time to time by the Board of Directors. The grantee shall not be liable for, and the Unit conveyed shall not be subject to a lien for any unpaid amounts due from the grantor before the statement date in excess of the amount set forth in the statement except interest, late fees and costs of collection accruing thereafter.

§7.6 Budget. The proposed budget adopted by the Association's Board of Directors shall be adopted unless rejected by a two-thirds (2/3) vote of all Unit Owners.

§7.7 Working Capital Fund. Each purchaser of a Unit shall contribute to a fund for the Association equal to two months common charges per Unit, to be paid by each Unit purchaser at the time of initial transfer of title from the Declarant to each Unit purchaser, which shall be paid to the Association, and used for such purposes as the Board of Directors may approve, including working capital, funding reserves and to cover operating deficits. Such fund shall be held in a segregated account, owned by and in the name of the Association, established at a Maine financial institution insured by the Federal Deposit Insurance Corporation or other equivalent federally sponsored insurance. No purchaser shall be entitled to a refund of such monies from the Association upon any subsequent transfer of a Unit.

ARTICLE 8 MAINTENANCE AND USE

§8.1 General Maintenance Responsibilities. The Units and Common Elements shall be generally maintained and repaired by each Unit Owner and the Association in accordance with the provisions of Section 1602-107(a) of the Condominium Act.

§8.2 Maintenance of Common Elements. Generally the Association shall be responsible for the maintenance, repair and replacement of the Common Elements, including but not limited to the sewage pump station and system (which shall be maintained and repaired in good condition in accordance with the manufacturer's recommendations), storm water system, snowplowing, street lighting and trash pickup (unless provided by the municipality), all as determined by the Board of Directors. If such repair or replacement of the Common Elements shall be necessitated by the negligence, neglect or misconduct of fewer than all of the Unit Owners, such cost shall be assessed to the Unit Owners responsible as a Service Charge.

Without limiting the foregoing obligations the Association shall be responsible for the following maintenance in accordance with the requirements of the Maine Department of Environmental Protection:

- (i) the Association shall be responsible for the maintenance of all storm water management structures, the establishment of any contract services required, and the keeping of records and maintenance logbook. Records of all inspections and maintenance work accomplished must be kept on file and retained for a minimum 5-year time span. The maintenance logbook shall be made available to the DEP upon request.
- (ii) Paved surfaces shall be swept or vacuumed at least twice annually in the spring to remove all winter sand, and periodically during the year on an as-needed basis to minimize transportation of sediment during rainfall events.
- (iii) Catch basins sumps shall be inspected in the spring and periodically during the year on an as-needed basis. If the catch basin sump is filled, sediment shall be removed via a vacuum truck or any mechanical means, with care taken not flush the sediments into the under drain soil filters or retention systems as it will reduce the system's capacity and hasten the time when it must be cleaned.

- (iv) If sediment in culverts or piped drainage systems exceeds 20% of the diameter of the pipe, it should be removed. This may be accomplished by hydraulic flushing or any mechanical means. All pipes should be inspected on an annual basis.
- (v) The underground detention system shall be inspected annually, with the initial inspection occurring 6 months after installation. If sediment is found during the visual inspection, a stadia rod should be inserted to determine the depth of sediment. If the depth of sediment exceeds 3 inches, the system should be cleaned using a vacuum process.
- (vi) Storm filters will be inspected after every major storm event and at least once every six months. Any trash or debris should be removed during the inspection. If the filter cartridges become clogged, they should be removed and replaced with clean cartridge units. Sedimentation should be removed from the vault via a vacuum processes.

§8.3 Maintenance of Limited Common Elements. Generally the Association shall maintain, repair and replace the Limited Common Elements, all as determined by the Board of Directors.

The Association may assess the costs of maintenance, repair and replacement of the Limited Common Expenses applicable to particular Unit(s) to such Unit(s) if the item giving rise to the expense shall be uniquely for the benefit of such Unit(s), as may be determined from time to time by the Board of Directors. If such repair or replacement of the Limited Common Elements shall be necessitated by the negligence, neglect or misconduct of fewer than all of the Unit Owners, in which case such cost shall be assessed to the Unit Owners responsible as a Service Charge.

Provided however that each Unit Owner shall be responsible for the cleaning of the interior and exterior glass surfaces of door and window, for the operation and maintenance of window and door locks, and removal snow and ice from the porch and deck Limited Common Elements appurtenant to the Unit, and maintain the sewer line leading from the Unit to the point where it connects to the common line, but the Association may elect to provide such services and assess the Units therefore as a Service Charge or as a part of the general Common Charges.

§8.4 Maintenance of Unit/Repair Responsibility. Each Unit Owner shall keep and maintain her or his Unit and its equipment, appliances and appurtenances in good order, condition and repair and in a clean and sanitary condition, whether such maintenance and repair shall be structural or non-structural. Each Unit Owner shall do all redecorating, painting and varnishing of the Unit interior which at any time may be necessary to maintain the good appearance and condition of such Unit. The Unit Owner shall clean the interior and exterior surface of windows in the Unit, including periodic washing.

No Unit Owner shall deposit any trash, dirt, debris or other substance from the Unit onto the Common Elements or Limited Common Elements, except in designated trash disposal areas.

Only ordinary household waste in normal quantities shall be deposited into the sewage system. No person shall pour any grease or non-household chemical into the sewage system.

The Board of Directors may adopt Rules and Regulations requiring the Unit Owners periodically to replace water heaters and washing machine hoses.

Each Unit Owner shall be responsible for all damage to any other Units or to the Common Elements resulting from his failure or negligence to make any of the repairs required by this Article. Each Unit Owner shall perform his responsibilities in such manner as shall not unreasonably disturb or interfere with the other Unit Owners. Each Unit Owner shall promptly report to the Board of Directors or the managing agent any defect or need for repairs for which the Association is responsible.

To the extent that any damage to a Unit is covered by the Association's insurance, the Unit Owner shall be responsible for (i) payment of the first \$1,000 of the insurance deductible, if any (or such other amount established by the Rules and Regulations) and for (ii) uninsured damage to any Common Element for which the Unit Owner is otherwise responsible due to the fault or negligence of the Owner.

§8.5 Liability of Owner. Each Unit Owner shall be liable, and the Association shall have a lien against his Unit for, all costs of maintaining, repairing or replacing any portion of another Unit or of the Common Elements including Limited Common Elements to the extent that such costs are caused by or attributable to such Unit Owner's wrongful or negligent act, neglect, omission or carelessness or by that of such Unit Owner's guests, employees, agents, lessees, invitees, or their pets. The Association shall have the right to repair any damage so caused, to cure or correct the cause of the damage and to maintain or replace such damaged Unit or Common Element to the extent the Association deems necessary and appropriate. Such liability shall include any increase in insurance rates occasioned by uses, misuse, occupancy, or abandonment of any Unit or its appurtenances. Nothing herein contained, however, shall be construed to modify any waiver by insurance companies of rights of subrogation against such Unit Owner.

§8.6 Use and Occupancy Restrictions on Units. Each Unit shall be occupied and used subject to the following restrictions:

(a) *Single Family Residential Use.* No Unit shall be used or occupied for any purpose other than for single family residential purposes, provided, however, that an occupant of a Unit may conduct business activities within the confines of such Unit so long as no signs are displayed, the Unit is not used for meeting with customers or third parties, and there is no noticeable increase in deliveries. Provided however that nothing in this Declaration or the Bylaws shall be construed to prohibit the Declarant from exercising any easements and Special Declarant Rights reserved by the Declarant, including without limitation promotional, marketing or display purposes, sales of Units and for customer service purposes, or from leasing Units owned by Declarant as provided in this Declaration.

(b) *Insurance.* No activities shall be carried on or materials used or kept in any Unit or any in the Common Elements that will increase the rate of insurance for the Property, or any part thereof, without the prior written consent of the Board of Directors. No Unit Owner shall permit anything to be done or kept in his Unit or in the Common Elements which will result in the cancellation of insurance on the property, or any part thereof, or which would be in violation

of any law, regulation or administrative ruling. No waste may be committed on or to the Common Elements.

(c) *Nuisance/Hazard.* No Unit shall be used so as to create a nuisance or an unreasonable interference with the peaceful possession or proper use of any other Unit or the Common Elements.

No owner or occupant of any Unit shall carry on, or permit to be carried on, any practice which unreasonably interferes with the quiet enjoyment and proper use of another Unit or the Common Elements by the Owner or occupant of any other Unit, or which creates or results in a hazard on the Property.

(d) *Pets and Animals.* The Association shall have the power to restrict and regulate pets and animals under the Bylaws or the Rules and Regulations of the Association as promulgated or amended from time to time. Upon notice and opportunity to be heard, the Board of Directors may expel any offending pets and animals from the Property.

(g) *Fire Safety and Noise Control.* No person shall impair nor remove the any acoustical, sound-deadening, or fire-resistant material from the walls, floors or ceilings of a Unit without replacing the same with materials of equal or greater such qualities.

(g) *Trash.* Trash, garbage and other waste shall be kept only in sanitary containers and shall be disposed of in such manner as may be prescribed in Rules and Regulations established by the Board of Directors. No articles of personal property belonging to any Unit Owner shall be stored in any portion of the Common Elements.

(h) *Electrical.* No Unit Owner shall overload the electrical wiring in the Condominium. No Unit Owner shall operate any machinery, appliances, accessories or equipment in such a manner as to cause, in the judgment of the Board of Directors, as appropriate, an unreasonable disturbance or make any alterations, repairs or modifications to or connection with the electrical or plumbing systems without the prior written consent of the Board of Directors, as appropriate.

Additional major appliances may not be installed in a Unit without the prior written consent of the Board of Directors.

(i) *Governmental Requirements.* All Unit Owners, Unit Occupants, their families, guests, invitees shall comply with and conform to all applicable laws and regulations of the State of Maine, and all ordinances, rules and regulations of the Town of Windham. An Unit Owner shall hold the Association and other Unit Owners harmless from all fines, penalties, costs and prosecutions for the violation thereof or noncompliance therewith.

(j) The Association's sewage system shall be used only for ordinary household purposes.

§8.7 Use of Common Elements. Subject to this Declaration, the Bylaws or by the Rules and Regulations adopted from time to time by the Board of Directors pursuant to its powers, each Unit Owner, occupant, tenant, guest, visitor and invitee may use the Common Elements in common with all other Unit Owners and their occupants, tenants, guests, visitors and invitees, in accordance with the single family residential purposes for which they are

intended, without hindering or encroaching upon the lawful rights of the other Unit Owners, upon the following terms:

(a) *Motor Vehicles and Parking.* Only passenger vehicles and trucks with a gross vehicle weight of less than 8,000 pounds may be kept or stored on the Property, and such vehicles must be in operable condition and fully licensed for operation on public highways.

No inoperable vehicles, nor any boats, recreational vehicles, snowmobiles, terrain vehicles or other vehicles or recreational equipment, trailers, or similar items may be kept or parked on the Property except within the garage forming a part of the Unit or as otherwise permitted by the Rules and Regulations. No snowmobiles, all terrain vehicles or similar items may be operated on the Property except in compliance with the Rules and Regulations.

Motor vehicles may be parked only in the garage and in the driveway adjacent to each Unit designated as a Limited Common Elements and in those portions of the Common Elements designated from time to time by the Board of Directors for parking. No parking shall be permitted in areas posted against parking by the Board of Directors, and no overnight parking shall be permitted in the common street. Other than the driveway Limited Common Element appurtenant to each Unit or as the Board of Directors may permit from time to time, any Common Elements designated as spaces for parking shall be used by the Unit Owners on "first come, first served" basis. No unattended vehicle shall be left in such a manner as to impede the passage of traffic or to impair access to driveway or parking areas.

The Board of Directors may adopt such Rules and Regulations as it deems necessary or appropriate to further regulate parking and the use and storage of motor vehicles generally.

(b) *Exterior Alterations.* Except with the written consent of the Board of Directors or as otherwise expressly provided in this Declaration, no person shall (i) construct or maintain any antennas, dishes, wires, cables, fences, decks, steps, signs, canopies, clotheslines or other structures, nor (ii) plant, trim, cut or remove vegetation, trees or shrubs, nor (iii) materially alter the grading or landscaping, nor (iv) do any other thing which affects the appearance from the exterior of the Common Elements or Limited Common Elements.

The Board of Directors may in its discretion designate areas in which Unit Owners may plant flowers and annuals based on plans specifically approved by the Board and subject to the obligation of the Unit Owner to maintain such items in good condition and repair, failing which they may be removed by the Association at the Unit Owner's expense.

(c) *Signs.* No signs of any character shall be erected, posted or displayed from any Unit, Common Element or Limited Common Element without the prior written approval of the Board of Directors, except for such signs as may be posted by the Declarant for the promotional or marketing purposes as permitted herein or as permitted by the Condominium Documents. The Board of Directors may also erect or authorize directional and identifying sign(s) listing the name and location of each occupant of the Units.

(d) *Obstruction/Storage.* No Unit Owner shall obstruct any of the Common Elements nor shall any Unit Owner place or store anything on any of the Common Elements except those

areas designated for parking by the Condominium Documents or as permitted by the Board of Directors pursuant to the Rules and Regulations.

(c) *Responsibility.* Neither the Board of Directors, the Association, any Unit Owner, nor the Declarant shall be considered a bailee of any personal property stored on the Common Elements (including vehicles parked on the Common Elements), whether or not exclusive possession of the particular area is given to a Unit Owner for storage or parking purposes. None of them shall be responsible for the security of such personal property or for any loss or damage thereto, whether or not due to negligence, except to the extent covered by insurance in excess of any applicable deductible.

§8.8 Leasing. A. No portion of any Unit (other than the entire Unit) shall be leased for any period. No Unit owner shall rent or lease a Unit other than in accordance with a written form of lease for a period of not less than six (6) months which contains the following provisions:

- (i) The tenant and all other occupants must comply with the Declaration, these Bylaws, and Rules and Regulations;
- (ii) The tenant failure to comply constitutes a default under the lease;
- (iii) The Board of Directors has the power to terminate the lease or to bring summary proceedings to evict the tenant in the name of the Unit owner after Thirty (30) days' prior written notice to the Unit owner, in the event of a default by the lessee in the performance of the lease, and
- (iv) In the event that the payment of Common Charges and/or Service Charges or other amounts due to the Association becomes more than 30 days past due, the Association may require the Tenant to pay directly to the Association the rent on the Unit in an amount of up to the balance of current and delinquent Common Charges and other unpaid amounts outstanding, subject to the rights of any recorded first mortgage or Eligible Mortgage Holder which has exercised an assignment of rents. The Association's notice to the Tenant shall be conclusive and binding on the Tenant as to the Tenant's obligation to pay the rent directly to the Association and as to the amount of Common Charges and other fees due. The Unit owner shall have ten days after such notice is sent to file any objection with the Board of Directors, which objection must be in writing and signed under oath under the pains and penalties of perjury, must contain a short and plain statement of any alleged errors by the Association, and shall include copies of cancelled checks or other written evidence of objection or miscalculation of the amounts due. The Unit owner must state what amounts, if any, which the owner admits is owed to the Association.

Every lease or tenancy shall be in writing. The foregoing provisions shall be deemed to be automatically incorporated into any lease and into the terms of any tenancy or other agreement for the occupancy of a Unit.

Each Unit owner of a Unit shall, promptly following the execution of any written lease of a Unit, forward a true copy thereof to the Board of Directors.

The foregoing provisions of this paragraph shall not apply to an institutional lender in possession of a Unit as a result of foreclosure, judicial sale or a proceeding in lieu of foreclosure.

B. In the event a guest or tenant of a Unit fails to comply with the provisions of this Declaration, the Bylaws, Rules and Regulations or the lease, then, in addition to all other remedies which it may have, the Association may notify the Owner of such violation(s) and demand that the same be remedied through the Owner's efforts within a reasonable time after such notice in the judgment of the Directors.

If such violation(s) is(are) not remedied within said period, then the Owner shall thereafter, at his own cost and expense, immediately institute and diligently evict his tenant or guest on account of such violation(s). In the event the Owner fails to so act promptly, then the Board shall have the right, but not the duty, to institute and prosecute such election as attorney-in-fact for the Owners and at the Owner's sole cost and expense, including all legal fees incurred. Said costs and expenses shall be due and payable upon demand by the Association and shall be deemed to constitute a lien on the particular Unit involved, and collection thereof may be enforced by the Board of Directors in the same manner as the Board is entitled to enforce collection of Service Charges and common charge assessments.

The Declarant shall have the right to operate any Units (even if not then created as Units) owned by the Declarant as a rental property, and may establish and maintain offices, signs and other accouterments normally used in the operation of rental properties in the Declarant's discretion. Such rental operations shall be for the benefit of the Declarant; neither the Association nor any Unit Owner shall have any interest or right in the profits and losses from such operations.

Section 8.9 Liability for Assessments, Etc. In the transfer of a Unit, the grantee of the Unit shall be jointly and severally liable with the grantor for all unpaid Common Charges, assessments and Service Charges, penalties, fees, interest and costs of collection outstanding at the time of the grantor's transfer, without prejudice to the grantee's right to recover from the grantor the amounts paid by the grantee therefore. However, any such grantee or proposed purchaser under a purchase and sale contract upon written request and upon payment of such fee as may be set by the Directors may obtain a statement from the Board of Directors setting forth the amount of unpaid, assessments, and Service Charges against the Unit, and the grantee shall not be liable for, nor shall the Unit conveyed be subject to a lien for any, assessments, and Service Charges arising before the statement date in excess of the amount therein set forth.

Section 8.10 Common Elements. No Unit owner shall execute any deed, mortgage, or other instrument conveying or mortgaging title to his Unit without including therein the interests in Common Elements appurtenant thereto, it being the intention hereof to prevent any severance of such combined ownership. Any such deed, mortgage or other instrument purporting to affect one or more of such interests, without including all such interests, shall be deemed and taken to include the interest or interest so omitted, even though the latter shall not be expressly mentioned or described therein.

ARTICLE 9 EASEMENTS

§9.1 Utilities, Pipes and Conduits. Each Owner shall have an easement, in common with all other Unit Owners, to use all pipes, wires, ducts, cables, conduits, public utility lines and other Common Easements serving his Unit and located in any of the other Units. Each Unit shall be subject to an easement in favor of other Unit Owners to use the pipes, ducts, cables, wires, conduits, public utility lines and other Common Elements serving such other Units and located in such Unit. The Association shall have the right to grant to third parties additional permits, licenses and easements over and through the Common Elements for utilities, ways, and other purposes reasonably necessary or useful for the proper maintenance and operation of the Condominium.

§9.2 Access. Subject to the terms of this Declaration, the Bylaws and the Rules and Regulations, each Unit Owner shall have an easement in common with all other Unit Owners to use the Common Elements as a means of access to and from his Unit.

§9.3 Association and Board of Directors Access. The Association and its officers and directors and such persons as may be authorized by the Board of Directors shall have the right of access to each Unit, as provided in Section 1603-107(a) of the Condominium Act for the inspection, maintenance, repair or replacement of the Common Elements and Limited Common Elements located in the Unit or accessible from the Unit or for making any addition or improvements thereto; or to make repairs to any Unit, the Common Elements or the Limited Common Elements if such repairs are reasonably necessary for public safety or to prevent damage to any other Unit, the Common Elements or the Limited Common Elements; or to abate any violation of law, orders, rules or regulations of the Association or of any governmental authorities having jurisdiction thereof. In case of an emergency, such right of entry shall be immediate whether or not the Unit Owner is present at the time. Upon request of the Association, each Unit Owner shall provide the Association with a copy of each key to the Unit.

§9.4 Encroachments. Each Unit and the Common Elements are subject to an easement for structural and lateral support in favor of every other Unit. If any portion of the Common Elements or Limited Common Elements hereafter encroach upon any Unit, or if any Unit hereafter encroaches upon any other Unit or upon any portion of the Common Elements or Limited Common Elements, as a result of settling or shifting of any building in which they are located, other than as a result of the willful or negligent act or omission of the owner of the encroaching Unit or of the Association in the case of encroachments by the Common Elements or Limited Common Elements, then a valid easement for the encroachment and for the maintenance of the same shall exist. In the event that a building is partially destroyed as a result of fire or other casualty or as a result of a taking by eminent domain or by deed in lieu of condemnation and is subsequently rebuilt, encroachments due to such rebuilding shall be permitted, and valid easements appurtenant thereto shall exist.

§9.5 Ancillary Easements through Common Elements. The Common Elements (including, but not limited to, the Limited Common Elements) adjacent to a Unit are subject to the following easements in favor of the adjacent Unit:

(i) For the installation, repair, maintenance, use, removal and/or replacement of pipes, ducts, heating and air conditioning systems, electrical, cable television, telephone and other communication wiring and cables and all other utility lines and conduits which are a part of or serve any Unit and which pass across or through a portion of the Common Elements.

(ii) For the installation, repair, maintenance, use, removal and/or replacement of lighting fixtures, electrical receptacles, panel boards and other electrical installations which are a part of or serve any Unit but which encroach into a part of a Common Elements adjacent to such Unit; provided that the installation, repair maintenance, use, removal or replacement of any part of the Common Elements shall not adversely affect either the thermal, fire safety or acoustical character of the building or impair or structurally weaken the building.

(iii) For driving and removing nails, screws, bolts and other attachment devices into the Unit side surface of the studs which support the sheet rock or plaster perimeter walls bounding the Unit, the bottom surface of joists above the Unit and the top surface of the floor joists below the floor of a Unit to the extent such nails, screws, bolts and other attachment devices may encroach into a part of a Common Element adjacent to such Unit; provided that any such action will not unreasonably interfere with the common use of any part of the Common Elements, or adversely affect either the thermal, safety, or acoustical character of the buildings or impair or structurally weaken the buildings.

ARTICLE 10 RIGHTS OF MORTGAGE LENDERS ON UNITS

§10.1 Right to Mortgage. Each Unit Owner shall have the right to mortgage or encumber his own respective Unit together with its appurtenant Allocated Interests. Except as provided by Section 1603-112 of the Condominium Act, a Unit Owner may not mortgage or encumber the Common Elements in any manner except as a component of the Allocated Interests appurtenant to his Unit.

§10.2 Identification of Mortgagee. A Unit Owner who mortgages his Unit shall notify the Board of Directors in writing of the name and address of his Mortgagee(s).

§10.3 Mortgage Foreclosure and Dispositions. Any holder of a first mortgage covering a Unit which obtains title to the Unit pursuant to a foreclosure or other exercise of the remedies provided in the Mortgage or through deed in lieu of foreclosure after written notice of default which deed identifies the circumstances classifying it as such a deed shall take title to the Unit with its appurtenant Allocated Interests, free of any claims for unpaid assessments for Common Expenses, Service Charges, late fees, interest and costs levied against such Unit which accrued prior to the acquisition of title to such Unit by the Mortgagee, other than the proportionate share of the Common Expenses which become due and payable from and after the date on which the Mortgagee shall acquire title to the Unit through a completed foreclosure or deed in lieu of foreclosure.

In the event the Association adopts any right of first refusal or purchase option arising in the event of the sale or transfer of a Unit, it shall not impair the right of an institutional mortgage lender to foreclose its mortgage, to accept a deed in lieu of foreclosure after written notice of default which deed identifies the circumstances classifying it as such a deed, or to dispose or lease a Unit so acquired.

§10.4 Eligible Mortgage Holder. "Eligible Mortgage Holder" means the holder of record of a recorded first Mortgage encumbering a Unit (a "Mortgage") which has delivered written notice to the Association, by prepaid United States Mail, return receipt requested, or by delivery in hand securing a receipt therefore, stating: (a) the name and address of the holder of the Mortgage, (2) the name and address of the owner of the Unit encumbered by such Mortgage, (3) the identifying number of such Unit, and (4) containing a statement that such Mortgage is a recorded first mortgage. The Secretary or manager of the Association shall maintain such information.

Eligible Mortgage Holders shall have all rights specified in the Condominium Act. Furthermore after the filing of the request by an Eligible Mortgage Holder, the Board shall cause notice to be sent to the Eligible Mortgage Holders (and any insurers or guarantors of such mortgages identified in the request), if any, of any one or more of the following events affecting the mortgaged Unit(s), if so requested.

- i. Default in the payment of Common Charges, Assessments, Service Charges, or other amounts due the Association which continues for Sixty (60) days or as required by the Condominium Act;
- ii. Default or violation of the Condominium Documents, or any proceedings by the Association relating thereto;
- iii. The expiration, cancellation or material modification of insurance required to be maintained under the Declaration or Bylaws of the Association;
- iv. A material amendment to the Declaration requiring the consent of Eligible Mortgage Holders;
- v. Termination of the Condominium pursuant to Section 1602-118 of the Condominium Act;
- vi. Change in the Allocated Interests of a Unit, voting rights, a change in Unit boundaries or the subdivision of a Unit;
- vii. The merger or consolidation of the Condominium with another condominium;
- viii. The conveyance or subjection to a security interest of any portion of the Common Elements; and
- ix. The lapse, cancellation or material modification of any insurance policy maintained by the Association or any use of any hazard insurance proceeds other than for repair or restoration of the Property.

- x. Such other events specified in the Condominium Act.

If in said request to the Association forwarded by an Eligible Mortgage Holder the mortgage is identified as being subject to the requirements of the Federal Home Loan Mortgage Corporation, the Federal National Mortgage Association, the Veterans' Administration, the Federal Housing Administration or other recognized institutional mortgage programs, then the Association shall maintain such hazard and other insurance policies and coverage required under said mortgage programs and identified in said notice from the institutional mortgage holder, to the extent such insurance is available to the Association.

§10.5 Mortgagee Approval Rights. For a material amendment to the Declaration or any of the actions specified below but subject in any event to the provisions of the Condominium Act, Eligible Mortgage Holders shall have the right but not the obligation in place of the unit owner to cast the votes allocated to that Unit or give or withhold any consent required of the Unit owner for such action by delivering written notice to the association with a copy to the unit owner prior to or at the time of the taking of the proposed action, which notice shall be sent by prepaid United States mail, return receipt requested, or by delivery in hand. Failure of the Eligible Mortgage Holder to so exercise such rights shall constitute a waiver thereof and shall not preclude the Unit owner from exercising such right. An amendment affecting any of the following is considered material:

- i. Voting rights in the Association;
- ii. Change in percentage liability for common expenses, assessment liens for common expenses, priority of assessment liens, or the subordination of assessment liens, or increases in the assessments of more than 25% over the prior year;
- iii. Reduction in reserves for maintenance, repair and replacement of Common Elements;
- iv. Responsibility for maintenance and repairs;
- v. Reallocation of pro rata interests in the Common Elements, the Limited Common Element or rights to their use;
- vi. Alteration of the definitions of the boundaries of any Unit, including the partition or subdivision of a Unit;
- vii. Convertibility of Units into Common Elements or vice versa;
- viii. Expansion or contraction of the Condominium, or the addition, annexation or withdrawal of property to or from the Condominium;
- ix. Hazard insurance or fidelity bond requirements;
- x. Imposition of any further restrictions on the leasing of Units;

- xi. Imposition of any restrictions on a Unit Owner's right to sell or transfer his or her Unit;
- xii. A decision by the Association to establish self-management after more than 50 Units have been created when professional management had been required previously by an Eligible Mortgage Holder or by the Condominium Declaration or the Bylaws;
- xiii. Restoration or repair of the Property (after damage or destruction, or partial taking by eminent domain or condemnation) in a manner other than that specified in this Declaration;
- xiv. Any action to terminate the Condominium after substantial damage destruction or condemnation occurs;
- xv. Any provisions of this Article and any other provision of this Declaration expressly benefits mortgage holders, insurers or guarantors; or
- xvi. Any provisions of this Article.

When Unit Owners are considering termination of the Condominium for reasons other than substantial damage, destruction or taking by eminent domain of the Condominium, the Eligible Mortgage Holders representing at least Sixty-Seven percent (67%) of the votes of Units subject to mortgages held by Eligible Holders must agree.

Approval shall be presumed when an Eligible Mortgage Holder is sent a written request for approval of a proposed amendment by registered or certified mail, return receipt requested, and then fails to submit a response within 60 calendar days after the notice is received.

§10.6 Mortgagee Priority. No provision of the Condominium Documents shall be deemed or construed to give a Unit Owner, or any other person, priority over the rights of any Eligible Mortgage Holder under its mortgage in the case of a distribution of insurance proceeds or condemnation awards for losses to or taking of Units, Common Elements, or both.

§10.7 Records. An Eligible Mortgage Holder may examine the books, records and accounts of the Association at reasonable times. The Association shall maintain current copies of this Declaration, the Association's articles of incorporation, Bylaws, and other Rules and Regulations concerning the Condominium as well as its own books, records, and financial statements available for inspection by Unit Owners or by any Eligible Mortgage Holder, insurers, and guarantors of first mortgages that are secured by Units available during normal business hours. Upon written request, any Eligible Mortgage Holder may obtain an audited statement of the Association's fiscal affairs prepared by an independent certified public accountant once the Condominium has been established for a full fiscal year, which preparation shall be prepared at the Eligible Mortgage Holder's expense.

ARTICLE 11 INSURANCE

§11.1 General. No later than the date of the first conveyance of a Unit to a person other than the Declarant, the Association shall obtain and maintain as a Common Expense, the policies of insurance described below to the extent such policies shall be reasonably available. If such insurance is not maintained, then the Association shall give written notice thereof to the Unit Owners and the Eligible Mortgage Holders. To the extent that such insurance subsequently becomes unavailable, the Association shall obtain as a substitution the most comparable insurance available. The Board of Directors is hereby irrevocably appointed as attorney-in-fact for each Unit Owner and for each Mortgagee and Eligible Mortgage Holder and for each owner of any other interest in the Property, for purchasing and maintaining the insurance, for the collection and disposition of any insurance, including distribution pursuant to Section 1603-113(c) of the Condominium Act, for the negotiation of losses and execution of releases of liability, and for the execution of all documents, and performance of all other acts necessary to accomplish these purposes.

§11.2 Property and Casualty Insurance for Units and Common Elements. The Association shall obtain and maintain in effect insurance policy covering direct physical loss to the Property with extended coverage, vandalism, malicious mischief, windstorm, debris removal, cost of demolition and water damage endorsements, issued by an insurance company authorized to do business in the State of Maine (which company shall also meet the ratings requirements of the Federal National Mortgage Association), insuring as a single entity the entire Property including the Common Elements, the Limited Common Elements Units, and the fixtures, supplies and common personal property belonging to the Association, *excepting* the land, foundations, excavations, and other similar items customarily excluded from property insurance policies and also *excepting* furniture, furnishings or other personal property supplied or installed by Unit Owners. The policy shall cover the interests of and name as insureds the Association, the Board of Directors, and all Unit Owners and their Mortgagees as their insurable interests may appear.

Such blanket or master insurance policy shall be in an amount equal to one hundred percent (100%) of the then current full replacement cost of the insured Property (exclusive of the land, excavations, foundations and other similar items customarily excluded from such coverage), without deduction for depreciation, together with coverage for the payment of common expenses with respect to damaged Units during the period of reconstruction. Such insurance policy may, at the option of the Board of Directors, contain such deductible as the Board of Directors shall reasonably deem appropriate but not to exceed the lesser of \$10,000 or one (1) percent of the policy's face amount. Unless otherwise established by the Board of Directors from time to time, a Unit Owner shall pay the expense of repair of damage to his Unit in the initial deductible amount of \$1,000 (as such greater amount as may be revised by the Rules and Regulations adopted by the Board of Directors from time to time) not covered by the insurance; the Association shall not be responsible for the costs of repair of damage to the Unit in the amount of the insurance deductible. Such casualty insurance policy shall also include the following provisions:

- (i) The following endorsements or their equivalent: (a) "no control," meaning that coverage shall not be prejudiced by any act or neglect of any occupant or Unit Owner or their agents, when such act or neglect is not within the control of the insured, or the Unit Owners collectively, nor by any failure of the insured, or the Unit Owners collectively, to comply with any warranty or condition with regard to any portion of the Condominium

over which the insured, or the Unit Owners collectively, have no control; (b) "Construction Code Endorsement" or "increased cost of construction," (c) "agreed amount" or elimination of co-insurance clause; and (d) "inflation guard," when it can be obtained.

(ii) That any "no other insurance" clause shall expressly exclude individual Unit Owners' policies from its operation, so that the physical damage policy purchased by the Board of Directors shall be deemed primary coverage and any individual Unit Owners' policies shall be deemed excess coverage, and in no event shall the insurance coverage obtained and maintained by the Board of Directors hereunder provide for or be brought into contribution with insurance purchased by individual Unit Owners or their Mortgagees;

(iii) The recognition of any Insurance Trust Agreement whereby the Board of Directors may designate in writing an Insurance Trustee to hold any insurance proceeds in trust for disbursement, as provided in Section 11.3 below; and

(iv) A standard "mortgagee clause" which shall: (a) provide that any reference to a mortgagee in such policy shall mean and include all holders of mortgages of any Unit, in their respective order and preference, whether or not named therein; (b) provide that such insurance as to the interest of any mortgagee shall not be invalidated by any act or neglect of the owners or any persons under any of them; and (c) waive any provision invalidating such mortgagee clauses by reason of the failure of any mortgagee to notify the insurer of any hazardous use or vacancy.

§11.3 Casualty Losses, Adjustment and Payment; Insurance Trustee. Any loss covered by the insurance policy described in Section 10.2 above shall be adjusted with the Association acting through its Board of Directors, but the insurance proceeds shall be payable to the Insurance Trustee designated for that purpose, if any, as provided in the Condominium Act and otherwise to the Association, and not to any Mortgagee. Any affected Unit Owner shall have ten (10) business days after receiving notice of the Association's proposed settlement with an insurance carrier in which to dispute the amount and terms of settlement with respect to his Unit; if the Unit owner objects then the Association may elect to assign such Unit damage claim to the objecting Unit owner and its mortgagee without further liability to the Unit Owner so that the Association may settle the balance of the claim and fund repairs for the benefit of the non-objecting Unit Owners.

The Insurance Trustee or the Association as applicable shall hold any insurance proceeds in trust for Unit Owners, Mortgagees and other lien holders as their interests may appear. The Board of Directors shall cause the Insurance Trustee or the Association to obtain a surety bond in 100% of the amount of the insurance proceeds for the faithful performance of the duties as insurance trustee before it shall be entitled to receive such proceeds. Subject to the provisions of this Article, the Bylaws and Section 1603-113(e) of the Condominium Act, the proceeds shall be disbursed first for the repair or restoration of the damage to the Property. Unit Owners, Mortgagees and other lien holders are not entitled to receive payment of any portion of the proceeds, unless either (i) there is a surplus of proceeds after the damaged Common Elements and Units have been repaired or restored, or (ii) the decision has been made not to repair or restore the damage as provided in Section 1603-113(h) of the Condominium Act, or (iii) the Condominium is terminated in whole or part.